A STUDY OF COGNITIVE PREFERENCES/STYLES

(IN RELATION TO AGE, ACHIEVEMENT, HOME ENVIRONMENT AND SOCIAL CLASS)

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PREFACE

The book examines differences in the learning processes by demonstrating that persons consistently adopt a characteristic approach to learning task which is called their styles of attending to particular information. The various terms used to denote a person's style are termed as Cognitive Preferences, Cognitive Styles, Cognitive Controls, Strategies and Cognitive System Principles etc. etc. The author has followed Heath's model which marked an important step in the field of measuring Cognitive Preferences. The novelty of his style lay in the fact that Heath set out to identify four types of Cognitive Preferences according to which individuals may be characterized. These were (a) Memory of specific facts or terms (Recall) (b) Practical Application (c) Critical Questioning and (d) Fundamental Principles.

The issues covered in the book have been grouped into seven chapters. Chapter I deals with the introductory overview of the topic objectives and significance of the study and description about the statistical techniques employed. Chapter II covers the review of the related literature. Chapter III includes the Plan and Procedure of the study, various steps involved in the construction and development of the test of Cognitive Preferences on Heath's Model, Achievement test in the subject Home Science, Social Class Scale and of Home Environment Inventory. Chapter IV deals in detail with the development of the test of Cognitive Preferences. Chapter V comprises presentation, analysis and interpretation of the data with regard to the relation between Cognitive Preferences and Age.

Achievement, Social Class and Ability modes. Chapter VI illustrates the relationship between Cognitive Preferences and Home Environment and the Last Chapter highlights the findings and conclusions with regard to the various aspects of the study and suggestions regarding the areas for further researches in this filed.

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Introduction

New Trend in Research and Cognitive Styles

In recent years, the research emphases in scholastic field have swung away from the predictive studies of success and failures in academic performance to attempt at understanding more of cognitive processes that underlie academic performances. Some major emphases have been upon the measurement of creativity and cognitive styles. In the latter cases, attempts have been made to explain differences in the learning processes by demonstrating that persons consistently adopt a characteristic approach to the learning task.

The use of the terms 'Cognitive Style' is not uniform such as 'cognitive controls', 'strategies', and 'cognitive system principles' have been used, synonymously to 'cognitive styles' but it is clear from the meaning attached to them that they have been used synonymously to 'cognitive styles'. The interpretation of cognitive style or whatever term is used as a preference is not a recent development, but is a constant interpretation adopted by a number of writers over the years. Although Gardner (1963) makes the claim that the discrimination between cognitive style as preference and cognitive style as ability is largely artificial, wherein, his own writings are more consistent with the preference interpretations.

Since number of writers have recognized the presence of cognitive styles in many different forms of behaviour it seems more meaningful to conceptualise cognitive style as stable preferences which manifest themselves in affects of abilities rather than abilities themselves, 'Cognitive functioning are comparatively stable overtime and to a large degree independent

of the nature of information presented to the learner.' This view was expressed by Witkins et al. (1967) and had been later criticized by Glasser in 1970. His claims were at variance with those of Witkins. His findings though revealed nothing novel but hailed the teacher who directs and disciplines the students'thought processes and influences the more of cognitive functioning.

But, the findings of certain science based on cognitive preference-studies were examined (Heath, 1964); (Atwood, 1967); (Marks, 1967). These studies established distinct differences in thinking styles to emerge from different curricular treatments. These findings seem to support a view that cognitive styles are discipline oriented. These findings do not necessarily preclude the possibility and indeed the probability that other types of `cognitive styles which are discipline free show a high degree of stability with time' (Kempa & Dube, 1969).

The interest in the identification and measurement of cognitive style was shown in Science education with regard to their potential usefulness for evaluative purpose not only in relation to curriculum development but also to extend the assessment of individual beyond the normal achievement test. If a goal of instruction is to change students' intellectual style within some academic subject a test of such achievement should permit a scope to the subject to exhibit different styles. The study of styles lead the leaders in education to match instructions to the needs and preferences of individual learner. Later, it became the major educational effort. This trend led to an extensive research on evolving means for extending the description of individual differences beyond the ubequitous and well crystallized popular notion of 'Intelligence quotient'. The first attempt in this effort was that 'Cognitive Styles' were usually conceived of habits that are spontaneously applied without conscious choice in a wide variety of situations. These styles were particularly supposed to be important dimensions to assess the educational processes, since they could provide a basis for improved instructional practices with facility.

Variegated Dimensions of Cognitive Styles

A variant of cognitive styles was the concept of cognitive preferences. It was primarily introduced by Heath (1964). Since

then, a considerable emphasis was laid on the development of cognitive tasks and cognitive style tests, both on the model earlier defined as the preference or ability modes. A new dimension of testing procedure, different from achievement, aptitude or attitude testing emerged, which was fully conceptualised as Cognitive style. To Messick these styles represent a person's typical mode of perceiving, remembering, thinking and problem solving. They are inferred from consistencies in a manner or form of cognition as distinct from contents of cognition or level of skills displayed in cognitive performance. Several illustrations of this sort can be presented as a variant of cognitive styles.

One such variant of cognition is identified in the field of thinking. It is a more general dimension of perceptional analysis, and this extended conception of dimension is termed field dependence v/s field independence. The perception of relatively field dependent subjects is dominated by the overall organization of the field, whereas relatively field independent subjects readily perceive elements as discrete from their background and is likely to overcome the organization of the field or to restructure it when presented with a field having dominant organization. On the other hand, relatively field dependent person tend to adhere to the organisation of the field as given. This, characteristic difference was also displayed in the manner of approaching the field where the field lacks inherent organization as in responding Rorschach Ink blots.

A number of correlates of perceptual scores were subsequently uncovered both in the areas of intellectual and personality functioning. Field dependence v/s field independence was now viewed as the perceptual component of broader dimension of articulated v/s global or analytical v/s global cognitive styles. The person who experiences in an articulated fashion tend to perceive items as discrete. When the field is organized and imposes structure on a field and so perceives it as organized, when the field has relatively little inherent structure. In contrast the experience is more global when it records with the overall character of the prevailing field that is given. It involves less intervention of mediators such as analysis and structuring. The 'Articulated Global' concept is applicable to the processing of information both from immediately present stimulus-configuration as in the perception or in symbolic material which justifies intellectual functioning.

From such evidences, it is clear that in cognitive style processings one is dealing with broad dimensions of individual differences that extends across both perceptual and intellectual activities. In this case the issue involves the characteristic approach of the individual that he employs into wide range of situations. That is the individuals 'style'. Because, the present approach encompasses both is perceptual and intellectual activities it is defined his articulated or analytical v/s global cognitive styles. It is another variant of cognitive functioning and entails a tendency to overcome the influence of over-organization embedded organization of field. Field dependent v/s independent as also the analytical global styles are basically perception oriented. But in analytical global styles the subject is more intellectually guided because it is analysis oriented. The ingredients of social orientation of field dependent persons have been ennumerated by the studies conducted by Dingman (1972); Oldman, Goodenough, Witkins, Friedman & Friedman (1975). The field dependent persons were perceived as fully born considerate, socially out-going, and affectionate while Woodworth & Albrecht (1958); Pimberten (1952); Weissenberg and Greenfield (1966) have also found these social qualities in field dependent persons. In contrast, the field independent persons tend to have a more impersonal orientations. The field dependent subjects favour educational vocational areas in which involvement with other is a central feature and in which the subject matter of the discipline presents human content. On the other hand, field independent subjects favour areas that are 'solitary' in their work requirement and 'more abstract' in their substantive contents.

This issue is concerned more with the affective domain that is, with the subjects' interests, attitudes, adjustments etc. What has been said in this discussion suggests that field independent persons are more likely to be aware of needs, feelings and attributes and ineffectively providing internal frames of references.

Although the researchers may broadly agree on a general definition of cognitive style. They have defined it experimentally in various ways. Consequently references to number of dimensions of cognitive styles have been given with restriction of the scope and space of this study.

One of the most frequently examined dimension of the style, the field dependence v/s field independence has been explained

in details above. Next in importance is the cognitive style; Levelling and sharpening. It contrasts simplicity of cognitive field with complexity and differentiation. Two other dimensions of cognitive styles that are similar in nature are known as category of width and equivalence range. Studies in this area have examined consistent individual preferences in modes of categorizing judged similarities and differences.

Kagan, Moss & Siegel studies, `A dimension of cognitive style, which they regard as similar to field dependence v/s independence.' They call the dimension analytic cognitive style and define it as, `the tendency to analyse and differentiate the stimulus environment in contrast to categorization that are based on the stimulus as whole.'

Finally, the cognitive style dimensions proposed principally by Broverman's development of cognitive style dimension largely stems from the test which he has used to measure them. This is the stroop word colour interference test used as basis for defining cognitive style dimensions. Conceptual v/s perceptual motor dimension or strong v/s weak automatisation dimension which are regarded as cognitive sub-systems. These are developmental in nature and are maintained by the force of habit strength associated with them.

The variegated dimensions of cognitive styles described above, although do not subscribe an exhaustive list; does include the major dimensions of cognitive styles of interest to psychologist. The details to measure these dimensions are not being discussed but it should be recognized that these dimensions vary as much as the definitions of the constructs, they report to measure.

Characteristics of Cognitive Style

The discussion so far made about the variegated cognitive functions of human behaviour, highlights the fact that styles of intellectual and perceptual functioning are part of the total personality and are intimately interwoven with effective temperamental and motivational structures. They seem to appear under differing modes but display essentially the common characteristics.

The cognitive styles are concerned with the form rather than the contents of activity. They refer to individual differences, how we perceive, think, solve problems, learn etc. Therefore, the definition of cognitive style was cast in the process terms, it is the central issue (Witkins et al., 1962). The more precise the specifications of these process-suggestions are for teaching practices to use (probably solving problems in studies) most appropriately would their styles be.

Cognitive styles are pervasive dimensions. They cut across the boundaries traditionally. So it is the feature of personality and not of cognition alone and it is inappropriate to believe that mental structure of a person can be compartmentalised. It is a wholistic entity. This characteristic has important implications for the educational setting. Reflecting their pervasiveness cognitive styles carry a message about what it is termed, `personality!.

Another characteristic of cognitive styles is that they are stable over time. Not that they are unchangeable, some may be altered easily in normal course of events. However, it can be predicted with some accuracy; that cognitive styles are also stable. A person who has a particular style one day will have the same style next day and perhaps; even an year later. So, stylistic dimensions are specifically useful for long range guidance and counselling.

With regard to value judgements, cognitive styles are bipolar. This characteristic is of particular importance in distinguishing cognitive styles from intelligence and other abilities. Each pole in cognitive style has adaptive value under specific circumstances and may be judged positively in relation to those circumstances. This is clearly evident in case of analytical v/s global dimensions. Competence in analysis or articulation may be seen as specifically suited to meet the requirement of particular task in career differences and also in psychiatric student nurses who were judged to be good by supervisors.

Functional, Individual Differences and Educational Implications

Consistent individual differences in the formal aspects of cognitive functioning have been uncovered. It is important to enquire into their possible implications for educational practices.

For this, the dimensions of analytic attitude offers the best example wherein educational practices can be fully implemented. The most important studies in these fields were conducted by Witkins et al. (1969) and Goodenough & Karp (1967) and Witkins & Berry (1975).

Witkins early works emphasized individual differences in a characteristic way in which people perceive both world and themselves. The more extensive studies on field independence and field dependence styles were conducted by Witkins and his colleagues. Sex differences have also been separately obtained on a measure of this dimensions with females being more field dependent and males relatively more field independent. On the other hand the developmental studies have indicated that the mode of cognitive functioning becomes progressively more articulated, and perception more field Independent, with age upto late adolescence. At the same time, however, a child's relative level of articulation vis-a-vis his peers is quite stable.

Differences have been noted in the type of defence mechanisms likely to be adopted by subjects at the two extremes of articulated and global cognitive style when confronted by conflict and stress. Articulated subjects are more likely to use specialized defences, such as intellectualization and isolation, and global subjects are more likely to use primitive defences, such as denial and repression. No general relation has been found, however, between the degree of articulation of the cognitive styles and the degree of personal adjustments or psychopathology.

Although, in most of this discussion one probably gets the impression that field independent subjects have the advantage over their field dependent peers,. Situations do exist where a more dependent reliance upon the external field, and particularly a reliance upon social stimuli for guidance and support pays off in the accrual of incidental information. Field dependent subjects have been found to be significantly better than field independent subjects, for example, in their memory for faces and social words, even though their incidental memory for non-social stimuli is not generally superior. The fact that certain types of problem-situations and certain types of subject matter favour field dependent subjects over field independent subjects, and vice versa (just as other types of problems might favour broad categorizers over narrow categorizers or levellers over sharpeners, and vice versa) is

extremely important, since it highlights the relativity of value of the opposing extremes of each cognitive style.

The perceptual and intellectual consistencies just discussed have been interpreted in stylistic terms, which implies, for example, that an individual spontaneously and habitually applies his particular degree of analytic or articulated field approach to a wide variety of situations. Even though, a relatively global individual may appear typically global in most situations, however, when confronted with a situation that patently demands analysis, it is conceivable that he might be able to analyse with acceptable skill. Yet, in the measurement of this cognitive style, it is usually presumed that subjects who characteristically display an analytic approach will, in fact, perform better on tasks requiring analysis (such as finding a simple figure in a complicated one) than will subjects who characteristically display a more global approach. Accordingly, most measures of analytic attitude are cast in an ability or maximum performance framework : if a subject does well at the task, he is assumed to have performed analytically; and if he does poorly, he is assumed to have performed more globally for to be inadequately applying an unfamiliar, a typical analytic approach.

Need Orientation of the Present Study

Much has been said about the cognitive styles as bipolar modes of thinking process but little seems to have been referred about the cognitive preference modes or the style of preference dimension. It was the basic tool for evaluating the Heath's model of cognitive styles and which the researcher also intended to follow in the present study. Gardner was very much emphatic upon removing the distinction between preference mode and cognitive styles. He asserted that the distinction between styles and preference modes was artificial. Dr. R. Chandra in his study, `The cognitive preferences of High School students' (1983) made a factor analysis of the four preference modes in his three subjects-study i.e. Physics, Chemistry and General Science. The test material was developed on Heath's model. The two factors in each case were invariably identified without regard to subjects. It was not surprising that each one of the two factors included two significant high loadings; one positive and the other negative. This led the

researcher to establish bi-polarity of scales within the four modes of Heath's Model indiscretely. Kempa & Dube (1978) in their study investigated the relationship between Biology and cognitive preference styles and generated two bipolar scale modes. The Curiosity scale and Utilization scale.

In this reference, Dr. R. Chandra's study was just a replication study, intended to harmonise the unnatural distinction created by the theorists between preference modes and cognitive styles. Thus, the findings of Kempa & Dube's study were not only reproduced but also bi-polarity of scales was affirmed as one of the characteristics of cognitive styles. Dr. R. Chandra's two factors : (i) Scientific curiosity, and (ii) Scientific utility, are also but, bipolar modes just defined. What is important to these findings is that the preference and ability modes which in the beginning were recognized as same by Gardner, were confirmed in the findings of Kempa & Dube, and also in Indian situation by Dr. R. Chandra. The test on preference modes can thus be described as belonging to both the personality and ability dimensions of individual's performance.

The recent researches into the multi-dimensionality of learners cognitive functioning demands not only the identification of cognitive styles but also the specific ways in which an individual attends to the learning material. In fact, it was proposed to foster rapid rate of intellectual development and to ensure the effective characterisation of students, cognitive development. Messick, realised the need of developing a proper test material of cognitive styles. As no single test of achievement or intelligence was competent to accomplish this task, moreover, it was supposed to provide a basis for adjusting instructional strategies to the learning characterisation of students. In addition, it would serve as parameter to the conventional cognitive effective measure. This measure might better serve to assess not only the intellectual performances but also the educational processes.

Heath (1964); Atwood (1966); Marks (1967); etc. developed different types of measures for different subjects, supporting Glasser (1970) view that 'Styles' are subject matter oriented. but each one of these authors recognised the superiority of cognitive style tests over achievement tests. Atwood specially criticised the achievement tests as limited, wherein, only one valid preference choice is made on very small portion of the topic or

subjects and fail to measure interests of examinee. The other way also he found cognitive preference tests not only reveal individuals cognitive capacities but also the integrated functions of the mind. Such tests have been found to be of more advantage than the test of achievement and general intelligence.

The researchers, who followed Heath's model described some of the advantages of its use. It was designed on the differing modes of approach. It marked an important step in the field of cognitive style research; for which he demonstrated a method of measuring cognitive preference within the same context as that to which the measurement is to be applied. His work, therefore, has an inspiration for this study. The novelty of his style lay in the fact that Heath set out to identify four types of cognitive preferences. These were : (a) memory of specific facts or terms, (b) practical application, (c) critical questioning of information, and (d) identification of fundamental principle. The distinction between this test and a conventional multiple choice test lay in the fact that all responses in the Heath's model are correct. The students were only required to report the order of preference of the correct response. First one was a response which was most satisfying and the last one, the least satisfying.

A good many of the subsequent studies were inspired by the novelty of Heath's approach. Marks found that cognitive preferences were unrelated either to ability or to achievement of students as measured by conventional examination. Heath was followed by P. Tamir in his study, 'the relationship between achievement in Biology and Cognitive preference styles in High School students (1976).' Clive Williams in his study of cognitive preferences (1970); Kagan (1963); Kempa & Dube (1978), and also R. Chandra (1983) developed their basic tools of measuring cognitive styles on Heath's model. The follow up of Heath by so many in their studies was a significant charm for the researcher also. Moreover, the variables selected for the study that is age, achievement and social class etc. had previously been studied by the earlier researchers in a similar way, and also because the construction of the test items on these four modes being simple the researcher also adopted the same model for her test in this study.

The correlational studies have been conducted to confirm relationships between cognitive styles and one or the other variables of the following : the age, achievement, the rote memory

academic aptitude, academic or scholastic achievements. The most popular of these were : Kempa & Dube (1978); Clive Williams (1976). In this regard Williams (1975); Tamir & Kempa (1977); Tamir (1978); reported that the four modes of cognitive styles were not related to the achievement scores on the test of rote memory academic aptitude and academic achievement.

Tashner (1973); Williams (1975); Tamir & Kempa (1977) also reported that there existed no significant difference between cognitive preference test scores on 'P', 'Q' and 'A' areas of cognitive styles of men and women. The sex differences were identified only on 'R' mode of Heath. Cross cultural differences were also studied by Tamir & Kempa (1977) with special reference to Canadian and Israeli students. What was specific with Heath's model was levelling the four modes of preferences, because the four modes identified by Heath were based on theoretical deductions rather than factor analysis study of the components. Williams (1975) also conducted a study on ordering the four modes and identifying the most preferred and least preferred modes.

The researcher being a student of Home Science was more interested in the replication of the studies conducted by the renowned authors in this field. She chose her own field untrodden by any of the researcher in the past. Can family be a prospective origin of these cognitive styles ? Can home and its total climate make a substantial determinants of the cognitive styles ? These were some of the Questions which the researcher had a point to study. Nothing of reference was available except that a complex study conducted by Witkins in which motherchild relations and child rearing practices as independent variables were studied to conclude, if they somehow contribute to the estimate of cognitive styles of the students. Such experimental studies were not possible in the Indian situations where foster mothers and real mothers with the same heredity could be studied in two different environments. The researcher had her own vision of the home environment which she presumed would certainly effect the modes of cognitive styles. So with different aims than what her predecessors proposed, she attempted her project :

Title : `A Study of Cognitive Styles of High School Students of Home Science in Relation to Age, Achievement, Home Environment and Social Class.'

Objectives of the Study

For its major goals the nature and development of cognitive styles is being study with regard to certain independent variables such as : Age, Achievement, Social Class and Home Environment. The reference field of study has been Home Science and referent subjects are girls. They have been ignored in the topics of researches done so far. The ensuing presentation is, therefore, designed to achieve the following specific objectives :

1. To develop a cognitive styles test for high school classes in Home Science on Heath's model.

2. To develop an achievement test for high school classes in Home Science to study its effects on cognitive styles of students.

3. To develop another independent variable - the social class scale to see its effects on cognitive styles of students.

4. To develop a Home Environment Inventory to study its effects on the cognitive styles of students.

5. To study the effects of age ranging from 13+ to 18+ on the cognitive styles of students of Home Science.

6. To study the correlates of achievement of high school girls in the cognitive styles of the students of Home Science.

7. To study the correlates of social class of students in cognitive styles of students in Home Science.

8. To study the relationship between the cognitive ability and preference modes of high school students in Home Science.

9. To study the relationship between cognitive style scales and their achievement in Home Science.

10. To study the effects of Home environment on the cognitive styles of students in Home Science.

Hypotheses of the Study

Hypotheses serve as beacon lights in conducting any research projects. They form an essential and indispensable part

of a study designed to make use of procedures of inferential statistics for the analysis of its data, although they are not completely ruled out even in a purely descriptive study.

The nature of the present study demands that prior to the collection of data, necessary hypotheses are to be formulated.

The formulation of hypotheses depends partly upon the findings of related researches and partly on investigator's intuitive understanding and insight. For the present study, the hypotheses have been stated in null form. The reason is obvious when they are conceived as research hypotheses, they are generally stated in the form of statement but when they are conceived as statistical hypotheses, usually they take the form of null hypotheses.

The following null-hypotheses have been designed for testing. The interval of confidence set up for the purpose of accepting or rejecting the hypotheses in the study according to the common practice is 0.05 to 0.01 levels. With due regard to the variables the following hypotheses are constructed:

1. There is statistically no significant difference between the successive pairs of age-groups of students from 13+ to 18+ on the mean scores of achievements on cognitive style test.

2. There is statistically no significant correlation between four cognitive styles scores of students and their achievement scores in Home Science separately.

3. There is statistically no significant correlation between the four cognitive styles of students paired separately with their social class scores obtained by them on these social class scale test.

4. There is statistically no significant correlation between the total Home environment scores of students and their four cognitive style scores paired separately with regard to each age group from 13+ to 18+.

5. There is statistically no significant correlation between each one of the 'A', 'P', 'Q' and 'R' cognitive styles scores and 12 factors of Home environment separately paired with each other.

Significance of the Study

Cognitive styles, by embracing both perceptual and intellectual domains and by their frequent implications in personality and social functioning also, promise to provide a more effective characterization of student's mental functioning than it could be provided by intellectual tests alone. This characterization should have relevance not only for the course of individual learning in various subject matter areas, but also for the nature of teacher-pupil interactions and the social behaviour in the class room.

Thus, cognitive styles by virtue of their widespread operations appear to be particularly important dimensions to assess for educational purposes. Yet, the very pervasiveness that undergoes their importance at the same time interferes with the measurement of other important personal characteristics such as dimensions of specific aptitudes and interests. This is because cognitive styles operate in testing situations as well, and frequently interact with test format and test conditions and influence the examinees score.

In the areas of teaching and learning knowledge about cognitive styles offers a number of opportunities of its use; but choices among them depend upon particular educational goals (and upon the much needed empirical research) for example as soon as we are able to assess the cognitive styles of students, we have the possibility of placing them in class room in specific ways perhaps in homogeneous grouping which is uniformly beneficial, for example, the recent study of ability grouping in New York city school, high ability students over the course of a year were found to gain an average of 20.7 months of the norms of world knowledge test when in homogeneous groups but an average of 14.7 months in heterogeneous class. Perhaps the teaching procedure geared to the homogeneous low ability students who learn from their brighter-peers in heterogeneous classes or view their excellence as a standard for personal strivings.

If we could assess cognitive styles of teachers and could also consider the possibility of assigning teachers to students to obtain particular combinations of styles that would optimally foster learning. We could also consider selecting particular teaching method that would be specially appropriate for certain cognitive styles and certain subject matters.

The other way also the findings of this study would be useful as the present study aims to identify exclusively the cognitive styles of girl students which has so far been a neglected area of study except in a comparative study conducted by P. Tamir (1976) where he concluded that females and males differ in their cognitive styles in relation to their achievements. Moreover, the result obtained for boys may not be applicable to girls. While Clive William (1976) stated that no statistically significant sex differences were found on any of the scales; even otherwise the predictions made in this regard are inconsistent, a study of this type would be of utmost importance for the purpose of giving conclusive remarks in this area.

Although cognitive preference testing has been successfully employed by Heath and others for the comparative evaluation of several science curricula., It has not been tried in other subjects, such as, language, science and specially Home - Science. The present study proposed to identify cognitive preference styles of girl students in the subject Home Science. This was of considerable interest as the cognitive preference styles, especially, if they are discipline-based, represent variables which, like academic achievements, emerge and develop in the learner through the process of education. The identification and effective measurement of these styles, used in addition to the grade, derived from the normal cognitive tests, could lead to a more valid and comprehensive characterisation of students' overall educational attainment than results from academic achievement tests alone.

Another unique feature of this study was that it was proposed to study relationship that existed between cognitive styles, with age, social class and home environment of the students, which to a large extent affect the whole of the personal make-up of the students. The findings of this study could be of great help in improving these conditions for the better developments of their personalities.

The researcher was of the view that the present study would be useful in the context of teaching Home Science. Her chief interest lay in identification of correlates of cognitive styles in Home Science. The findings of the present study would provide a frame of reference for curricular development and would supply relevant data regarding cognitive processes that would not only help in

integration and assimilation of information but would also help in evolving a hierarchy of contents of the subject.

The findings of this study might reveal a significant process approach also in the form of technology of Education. The findings of this study focus on the pervasive influence of the technique. It might supply a guideline for the development of a technology which involved a proper and defined use of questioning technique. It is a general agreement with regard´ to conceptual development of this study that technological innovations are expected from the findings of this study. Analysis with regard to Questioning, Recall, Application or Principle may also evolve a novel process approach for the better learning of the girls.

Definition of Terms and Concepts

Some terms and concepts occur in the study, which in the lack of uniformity of understanding the meanings of the terminology used, may introduce an element of confusion. Hence, to avoid the danger of their misinterpretations and misjudgment, the researcher on her own-self takes the responsibility of defining these terms and concepts.

Cognition

It is a general term covering various modes of intellect such as knowing, perceiving, remembering, imagining, conceiving judging, reasoning etc. All these mental operations are reflected in the usual behaviours of human being. It may look very simple, if we define each one of the human behaviour as 'Cognition'. Because, whatever, the way we move or sit to reflect upon the problems of any sort, is manifested through some sort of behaviours in some way or the other involve our mind. So, all activities from simplest to most complex is cognition.

Cognitive Mode

The cognitive mode is contrasted with affective or conative modes of feeling and willing (Flavell). Cognitive modes or styles as these two terms have been adopted synonymously are the ways of mental operation. Thus, the cognitive styles of an individual are the

habitual mode of processing information adopted by him. Individual differences exist on cognitive mode and also preference styles. One scheme of cognitive mode variables as conceptualised by Heath includes Recall, Principle, Application and Questioning or Critical Questioning. In studying the cognitive modes the investigator proposed to follow Heath's scheme.

Cognitive Styles

These, as defined by Heath, are, differing modes of attending to the subject matter of a course.' Here, the interest is focused more on the way the subjects attend to a problem rather than the way he recalls the correct information. It is the way how he is likely to do with information mentally. Cognitive styles have been conceptualised as more or less consistent and stable in nature. Messick (1970) doubted about the mutability of cognitive styles with age. But he asserted that, 'through manipulation of educational experience, we might convert cognitive styles into cognitive strategies' by which he meant, 'a conscious choice among alternative modes of perceiving remembring, thinking and problem solving.' But for attaining this he warned about the necessity of undertaking such action at an early stage before a particular style crystallizes and becomes predominant. Ram Chandra (1983) has also asserted the stable nature of cognitive styles as we grow older. Siegel and Siegel (1963) raised the question and proposed that, if cognitive processes are relatively fixed, steps should be taken to arrange for congruence between the students; set and the goals imposed upon him.

Heath suggested four modes of cognitive preferences in which an individual can attend to scientific information. These were 'Recall' : acceptance of scientific information for its own sake i.e. without the consideration of its implications, 'Application' : acceptance of scientific information in view of its usefulness and applicability in general, social or scientific context. 'Principle' : acceptance of scientific information because it exemplifies or explains some fundamental scientific principle or relationship and 'Critical Questioning' : acceptance of critical questioning in view of scientific information as regards to its completeness, general

validity or limitations. The present study proposes to identify cognitive styles of girl students of High School classes in Home Science by adapting Heath's model.

Social Class

Social class is a very complex concept and defies the precise and universally acceptable definition. Definitions given by western philosophers could not be applicable in Indian context because it is a caste ridden system. In west three different criteria were accepted to determine social class of a· person. They are : economic condition, status, and cultural reality. Whereas, status of the student is ascribed by birth in India, as it is the caste of a person; the other two are achieved. As status is of no consequence in open societies of the west hence the other two criteria i.e. economic condition and cultural reality are mostly used to define social class. Ginsberg social class is a group of individuals, who through common consent and similarity of occupation, wealth and education have come to have a similar mode of life. Maxweber and Sombert's views also fully coincide with this definition. The approach adopted in this study follows Ginsberg's thinking and social class categories are to be formed on the basis of education, occupation, income and cultural/material possessions of parents of the sampled students. The researcher could not locate any study except that of R. Chandra (1983), where effects of socio-economic status are investigated. The study concluded of no statistically significant relationship between cognitive styles and socio-economic status.

Home Environment

The traditional approach to measurement of home environment has been to find a crude and indirect index, such as socio-economic level of parents, that is the income, education and occupation of the parents and also sometimes the relations and resources like physical facilities at home and material resources provided by the parents. Such variables have been shown to relate to intelligence. Their explanatory force has been displayed clearly to be weak and fragile.

Witkins and his colleagues (1965) have studied the patterns of maternal child-rearing practices and mother-child relations. They found it to be significantly related to performance scores of children. Freud, Flugel, Strecker etc. have stressed that psychological damages are caused by maternal dominance or over protection of the child. Highberger (1968) held that the degree of adjustment of children that they make outside their home is markedly influenced by the type of relationship, they have at home. Piaget (1952) and Gagne (1968) have asserted that environmental stimulation is associated with more specific learning. Kagan, Moss and Siegel (1963) ; Witkins, Dyk, Faterson, Goodenough and Karp (1962) have supported about the existence of relationship between environmental factors and cognitive style. Hess and Shipman (1965) found a significant relation between maternal 'teaching style' and children's problem solving ability.

Pauline A. Jones (1972) took the following aspects under the concept of Home environment :

1. Disposition to encourage the child to interact with his home environment on a verbal cognitive level.

2. To have higher academic and Vocational aspirations and expectations for the child.

3. To have greater knowledge of, and interest in, the child's academic and intellectual development, and

4. To provide more material and organizational opportunities for the use and development of language ability.

The investigator developed a home environment inventory to measure home environment of the children. This inventory consisted of twelve factors which constituted the elements of home environment. These were : Recognition of child as a person, praise for obedience, care for the child, Observance of family traditions, Forcing the child to complete any given work, Parental aspirations for the child, Forbearance for child's wishes, Anxieties about the child, Reproaches and punishment for undesired behaviour, Explaining undesirability of the lie, Parental affection and Indoctrination.

Delimitations

√The present study was limited in terms of sample, geographical location and content. The specifications of such delimited measure are given below :

The sample was limited to girl students of HIgh School classes of Agra city who have offered Home Science as one of their optional subjects. Selection of Girls only was an obligation as Home Science is a subject which can be opted by girls only. The High school girl students of Agra city were selected with a purpose to have a direct contact with them for the collection of reliable and valid information. The researcher being a resident of Agra city could approach them directly.

2

Review of the Related Literature

J The   present chapter incorporates a brief review of the
researches done in the area related to this investigation. The
purpose of reviewing the earlier researches is not only to
economise the historical perspective of the present work but also
that the related studies that have taken cognizance of one or more
variables included in this study and as such these studies may help
the investigator to design her study in a manner such that recur-
rence of the short comings and pitfalls observed in any earlier study
may be checked. Alternatively, their findings   may be utilized to
substantiate and support, wherever, necessary   for the interpreta-
tion of the results of the present study.

The investigator made a survey of the literature related to the
present work and came to the conclusion that, not many researches
of this type have been carried out in India. However, quite a few
studies of this type have been conducted in foreign countries. The
studies related to cognitive preferences and cognitive styles are
available. The studies related to one or the other specific objective
laid down in the present study are also available. No single study
has been located which encompasses all the aspects of the present
work. Hence, the studies available in this field are partially related
to the present   problem. Therefore, for convenience only those
studies have been   reviewed by the investigator   which have a
relevance with one   or   the   other variables of this study. To
substantiate the studies are reviewed under four subcategories :

i)   Studies on cognitive preference styles of Heath and other
       models.

ii)   Studies done in India and abroad on different aspects
       of cognitive styles.

iii)   Studies done on the development of achievement tests (A
        test on 'Home Science' is a rare phenomenon).

iv)   Studies on environmental effects such as home environment,
        S.E.S. etc.

I. STUDIES RELATED TO COGNITIVE PREFERENCES AND THEIR RELATIONSHIP WITH OTHER FACTORS

2.01 A study 'College students' cognitive preferences in Science'
     was conducted by Pinchas-Tamir and R.F. Kempa (1977).
     This study was carried out in two phases :

     In the first phase the study aimed at :

1)   To determine the interrelationship among four cognitive
     preference areas in chemistry.

2)   To find out whether and to what extent are cognitive
     preferences in chemistry related to : (a) Sex, (b) Achievement,
     (c) Major field of study and (d) Career expectations.

     The objectives defined for the second phase were :
1)   To replicate the above first and second objectives.

2)   To determine the extent to which cognitive preference
     styles differ in the same college students across different
     science disciplines e.g. Chemistry, Biology, and Medicine.

3)   To determine whether college students possess a
     generalized science cognitive preference contrasted to
     chemistry specific discipline.

     Sample : The study in the first phase was conducted on the
299 first year students of Clareton, Ottawa, Canada University for
the year 1972. In the second phase the sample consisted of 50
first year students of Hebrew University for the year 1975.

     Procedure : A fifty item 'Cognitive Preference Inventory' in
Chemistry designed and validated by Wilkinson and Kempa was
used in phase one and a sixty item 'Cognitive Preference, test
consisting of twenty items in Chemistry, twenty in Biology and
twenty in Medicine was used in phase two of the study. The total
test was divided by a stratified random sampling into two forms,
each comprising of ten Biology, ten Medicine and ten Chemistry

items. For evaluation, the graded procedure suggested by Kempa and Dube was employed. Thus, for each cognitive preference the highest possible score was 'four', the lowest possible score was 'one' and a random distribution yielded a mean score of 2.5. In the first phase of the study, the achievement was measured by the mid-year chemistry grade and in phase two, three measures of achievement were used. These were : The end of year grades in Biology and Chemistry and the grade point average. Background information regarding sex, career expectations, major field of study was obtained by a short Questionnaire. The statistical analysis employed were means, standard deviations, correlations, factor analysis, analysis of variance and 't' test in those cases which yielded statistically significant 'F' values.

Findings : The results were presented separately for each of the two phases :

Phase one : The intercorrelations among the four preference areas presented in Table 2.01 and results of the factor analysis presented in Table 2.02 confirm the two bipolar scales suggested by Kempa and Dube in 1973.

Table 2.01

Intercorrelations of scores in Cognitive Preference Areas (n=299).

		R	P	Q	A
Recall	(R)	1			
Principle	(P)	-0.09	1		
Questioning	(Q)	-0.55	-0.45		1
Application	(A)	-0.48	-0.57	0.24	1

Table 2.02

Varimax analysis of cognitive preference areas.

Area	FACTORS	
	I	II.
R	0.98	-0.04
P	-0.03	0.98
Q	-0.69	-0.39
A	-0.42	-0.70
Percentage of variance.	40.34	40.07

2. The correlation between achievement in Chemistry as measured by the mid-year chemistry grade and each of the cognitive preference scores were computed. Only one statistically significant coefficient between achievement and (P) was found and even this was rather low ($r=0.15$, $n = 299$).

3. There was no significant difference between males and females.

4. There was a tendency of the research group to a relatively low 'R' and high 'Q' score. Physical science majors compared with other groups exhibited a unique cognitive preference pattern. They were lowest in 'A' and significantly higher than the biology, earth science and engineering majors in 'P'. This finding points at the dependence of cognitive preferences on specific subject matter areas.

Phase two : In phase two, the comparison of the data between Israeli and Canadian samples showed that Israeli and Canadian students were similar in P and A. Moreover, the Israeli students compared with the Canadians had a higher preference for 'Q' and lower preference for 'R'

2. First year college science students in Israel displayed on the average, a strong bias for 'P' and 'Q', a weak negative bias against 'R'. The only exception is medicine, where 'A' and 'R' reverse their positions. It is an indication of intellectual maturation which has developed since the 10th grade by gradually becoming more curious, more critical and less satisfied with information for its own sake.

3. When Biology, Chemistry and Medicine groups were compared, the highest levels of preference displayed were 'R' for Medicine, 'P' for Chemistry and 'Q' for Biology. The conclusion drawn was, that while certain tendencies appear to cut across the three disciplines, some significant differences exist which support the notion that cognitive preferences are, to some extent discipline dependent.

4. Low correlations were found between achievement and cognitive preference scores. The only significant correlations obtained for the grade point average was with mean cognitive preference in biology ($r = 0.29$, $n = 112$).

5. There were statistically no significant difference between males and females.

6. Significant differences among first year college students with different major field of study were revealed. It was seen that Physics majors tend to have high preferences for 'Q' and Q R as well as the lowest for P A in Medicine. Biology majors have the higest Q and Q R mean scores in Biology, as well as, the highest P A score in Medicine. Chemistry and Medicine majors tend to have lower Q R and P - A scores, compared with both Physics and Biology majors. There were no difference between Chemistry and Medicine majors.

7. Medical students who would like to work in clinic tend to be highest in R and lowest in Q, thereby possessing a negative Q R mean score. Those included under 'others' as well as those aiming at teaching and at university careers have the highest Q R score. Those aiming at research occupy only a middle position on the Q R scale.

8. The two scales, namely 'Curiosity Scale' (Q R) and the 'Utility Scale' (P - A) were unambiguously established, once again.

2.02. Marks conducted a study entitled, 'CBA high School Chemistry and Concept formation.'

Objectives

1) The main objectives of the study were to compare the cognitive preferences of students enrolled in CBA Chemistry classes with the cognitive preferences of students enrolled in the traditional High School classes.

2) Another object was to find out correlation between cognitive preferences and achievement.

Sample : The sample of the study comprised of 433 students of CBA courses who formed the experimental group and 622 students of traditional course who formed the control group, taught by 24 teachers of CBA Chemistry and 30 teachers of traditional Chemistry respectively.

Procedure : The students were administered the following tests for collection of relevant data :

1)   Cognitive preference test (CPT).

2)   A traditional achievement test (ACT).

3)   An achievement test for new curricula (CBA Final).

4)   School and College ability test part I and II Fort I (SCAT).

Besides this their marks in 'A Cooperative Examination' High School Chemistry, were also collected.

The mean and standard deviations of all pre-test and post-test programmes were computed for both the groups. Analysis of variance 2 x 2 factorial design, was performed on the data to determine, if the ability of the two groups could account for the differences in cognitive preferences.

Findings : It was indicated that there is statistically significant difference between control group and CBA group for all cognitive preferences except that of practical application.

2. When achievement scores were related to the cognitive preferences of students by means of analysis of variance, it was found that neither the ACS cooperative examination nor CBA final examination was criterion for fore-casting cognitive preferences of these students. Thus, the hypothesis that cognitive preferences could be related to achievement was rejected.

3.   Besides this, the findings suggested that cognitive preferences are not related to abilities of the students as measured by SCAT.

2.03. Another study 'Cognitive Preference Orientations in students of Chemistry', was conducted by Kempa and Dube (1973).

Objectives

The main objectives of the study were :

1)   To develop a chemistry-based cognitive preference test.

2)   To identify students preferred mode of attending the scientific subject matter.

3)   To examine the effect of academic achievement in Chemistry on cognitive preference profiles of the students.

Sample : The sample of the study consisted of 284 male students drawn from the thirteen randomly selected grammar comprehensive schools of America who completed 'O' level course in Chemistry.

Procedure : A 40 item cognitive preference test was constructed by the researcher following the Heath's model. A detailed cognitive analysis of the subject matter content of all current 'O' level Chemistry syllabus was carried out to ensure that all informations incorporated in the cognitive preference test fell within the cognitive frame-work of students. The information selected for test items and associated responses were scrutinised by an independent panel of experts and judged to be suitable for the test population.

A graded rating procedure was adopted for evaluation of scales on this test. In this, the students were asked to arrange the options within an item in an order of preference by allotting four votes to the most preferred option, three votes to the next preferred, two votes to the next and one vote to the least preferred response.

The feasibility of the modified rating procedure was established in a trial administration of the test. Items were analysed by calculating the preference index for each response option, using

Preference Index = $\dfrac{\text{E score on a particular response}}{\text{E score for all responses in item.}}$

Items having responses with preference indices outside the range 0.20 to 0.30 were considered to be 'biased' and not included in the final test. The reliability of the test was examined by the test-retest procedure, carried out on the pretest population after a time interval of six weeks, and gave the following results :

r_{11} (recall) =0.69; r_{11} (application) = 0.855.
r_{11} (principle)= 0.804; r_{11} (questioning) = 0.810.

Findings : The test was found to be highly discriminating as was verified due to large standard deviations.

2. Comparison of the mean scores for students in different achievement categories revealed a strong dependence of cognitive preference orientation on academic achievement. High achieving students exhibited strong preferences for the principles and critical questioning areas, and showed relatively little

satisfaction from responses relating to recall and application situations. Low achievers displayed reverse characteristics.

It was also found that two major interdependences exist within the four cognitive preference areas : `recall' scores appear highly and negatively correlated wih the `critical questioning' scores as application' scores with `Principles' scores.

The correlations between R and A, A and Q, and P were weak and suggested no extensive cross-influences to exist between these areas.

2.04 Another study in this field entitled, `The Change in Cognitive Preferences of High School Physics students' was conducted by Atwood (1969).

Objectives of the Study

The main objective of the study was to measure change, due to instruction, in cognitive preferences between the students of PSSC courses.

Sample : The sample consisted of 27 'PSSC' and 'Non-PSSC' students taught by six instructors.

Procedure : A 34 item-cognitive preference test was used. Each of the test item was followed by four options representing preferences i.e. memory of facts (m), application of knowledge (Ap), Questioning (Q), and fundamental principle (Pr). The application category was subdivided into : (a) Scientific practical application (AP-S) and (b) Every day practical application (AP-E).

A traditional achievement test (ACT) was used to compare mean and standard scores of both the groups.

Findings : The study revealed the following facts :
1. No significant difference between pre-test and post-test cognitive preference scores was found for non-PSSC students. But on students of PSSC group significant difference was found in cognitive preferences only in one area i.e. scientific practical application.

2.05. Another study worth mentioning here is that conducted by Pinchas Tamir (1975).

Objectives

The objectives of the study were to find out the possible effects of four important school variables i.e. the school environment, the attitude of teachers towards enquiry oriented approach (designated as teacher's curriculum bias), the nature of the curriculum and of the subject matter on the cognitive preference styles of the students.

Sample : The sample of the study comprised of 989 Biology students divided into 408 BSSC and 58 Non-BSSC students.

Procedure : The teachers were administered the Blankenship Attitude Inventory consisting of 46 items. The teachers whose scores were above the mean - 30.74 were designated as BBSC supporting, the remaining group of teachers whose mean scores were below 30.74 were designated as non-supporters and accordingly the students were also divided. To analyse the data, the means, S.D., 't' values, correlations and 'F' values were computed. Analysis of variance and factor analysis were also computerized for the groups:

(i) Males v/s females. (ii) City students v/s Village students and (iii) BSSC v/s Non-BSSC students.

Findings : The findings of the study revealed the following facts :

I) Israeli High School students have a strong bias in favour of 'P'.

ii) Without giving any consideration to achievement, females possessed a higher preference for P' while males possessed a higher preference for 'Q' and 'A' and BSSC females displayed the highest preference for 'R'.

iii) Students of city schools preferred 'P' mode of preference highest while students of agricultural/village schools preferred 'R' and 'A' modes to 'Q' mode.

iv) BSSC students compared to Non-BSSC students showed higher preference for 'Q' and a lower preference for 'R'.

2.06. To investigate students learning with respect to cognitive
       preferences Witkins (1976) conducted a study entitled, `A
       Study of Cognitive Preferences to interpret Student
       learning in Biology, Science, Curriculum.'

Objectives : The following were the main objectives of the
study :
1.   To investigate the effect of the goals of instruction of the
     BSSC-Green version Biology curriculum on the students
     mode of problem solving or inquiry.
2.   To find out the relationship between cognitive preferences of
     the students of BSSC and conventional biology students with
     their achievement or ability.

Sample : The sample consisted of 1200 students divided into
BSSC-traditional or conventional classes.

Procedure · : The students were administered Watkin's
cognitive preference Inventory twice, first time for pre-test and
second time for post-test. To measure achievement of these
students Nelson's Biology test was given and comprehensive
final examination scores were also considered. Ability was deter-
mined by using mean I.Q. score provided by each school's
guidance department.

Findings : Students of BSSC showed greater preference for
memory and critical questioning. Both BSSC and conventional
groups had lower mean scores in application. The BSSC popula-
tion mean score were higher and significant compared to
conventional school population in achievement.
       These four variables were selected because of their
previous history as potential contributors to learning out comes gen-
erally and to cognitive preferences particularly (i.e. Tamir, 1975a;
Tamir, 1975b).

2.07. A study 'The relationship between achievement in biology
       and cognitive preference styles in High School students'
       was conducted   by Pinchas Tamir (1976) to find out
       relationship between cognitive preference styles in biology
       and achievement in the same. The study also aimed to find

out whether specific subject matter areas exert specific effects on the relationship between cognitive preferences and achievement.

Another objective of the study was to find out the impact of sex, type of school, curriculum and curricular bias of teachers on this relationship between cognitive preference style and achievement in biology.

Sample : The sample consisted of 989 Israeli twelfth grade students representing city, agricultural and kibbutz High Schools, Out of this sample, 408 students studied the Israeli BSCS Adaptation, Programme for four years (They were designated as BSCS) and the other 58 students studied traditional biology (They were designated as Non-BSCS). All the teachers (n=50), who were administered the tests responded to the Blankenship Attitude Inventory (1966) and were classified on the basis of their score into two groups. The first group (n=24) whose scores were above the national mean of 30.70 were designated as BSCS supporters. The other group (n=26) - non-supporters - comprised teachers who scored below the national mean.

Procedure : A forty item Biological Cognitive Preference Test (BCPT) was used to identify cognitive preferences of the students. It was constructed following an analysis of the subject matter content to ensure that all information incorporated in the test fell within the cognitive frame work of the sampled students. Three areas namely Botany, Zoology and Human Biology were identified to find out the effect of specific subject matter areas on Cognitive preferences. The key (allocation of each option to one of the four cognitive preference areas) was determined by expert judges and only items reaching at least 90 per cent agreement were included. The graded rating procedure suggested by Kempa and Dube (1973) was employed. A 30 item Biological Achievement Test (BAT) was given to know their achievement in Biology.

Findings
1. i) Israeli students exhibited a bias for 'P'.

   ii) Comparison of the mean scores of students in different achievement categories revealed a strong dependence of

cognitive preference orientation on academic achievement. High achieving students exhibited a strong preference for 'Q' a weak preference for 'P' and a strong dissatisfaction with 'R' Area 'A' did not discriminate between high and low achievers.

iii) Low achievers in Botany preferred 'A' more than high achievers.

iv) Different achievement groups in Zoology did not differ in their degree of preference for 'R'.

v) High achievers in Human Biology had a higher preference for 'P' as far as general Biology was concerned, but not so regarding Human Biology. Thus, it was concluded that the relationship between cognitive preference and achievement depended to some extent, on the subject matter content of the cognitive preference tests employed.

II.   Cognitive preferences were not related to the cognitive ability levels of Bloom's Taxonomy.

III.   Both males and females with high achievement scores have a preference for Q but only among the boys the high achievers showed greater preference for P. Among the girls the low achievers showed greater preference for R. Among students with high achievement scores males tend to prefer R more than females. Girls with low levels of achievement showed greater preference for R than the low achieving boys, who tended to opt for Q.

IV.   A comparison of students in three different types of schools revealed no significant difference between groups of high and low achievers in city schools, while in agricultural schools a high-low difference appeared in Q.

V.   So far, as the nature of the curriculum is concerned, it was found that the high-low achievements differences were greater for Non-BSCS students than for the BSCS. The Non- BSCS low achievers were extremely high in R and low in Q.

VI.   So far as the effect of the curricular bias of the teachers is concerned, the low achievers taught by BSCS supporters had high R, low Q, and low P, while the high achievers had very low R, high Q and high P. On the other hand the low achievers taught by non-supporters of BSCS, had very high R

and very low Q, while the high achievers of this group had low R and low A.

VII. The conclusion of the study was that cognitive preference achievement relationship is not unidimensional. Rather, it depends on a combination of personal, environmental, subject matter and instructional variables.

2.08. Another study entitled, 'An Evaluation of the Effect of Inquiry Oriented Social Studies Curriculum, Teacher Cognitive Preference and student characteristics on the Cognitive preferences of the students' was conducted by Hobbs (1977).

Objectives : The main objectives of the study were:
1. To develop a cognitive preference profile for the 7th grade level in Texas History students.
2. To evaluate the effect of curriculum, teachers' cognitive preferences, achievement and sex on cognitive preferences of the students.

Sample : The sample comprised of 250 students enrolled in 7th grade Texas History Classes.

Procedure : The cognitive preferences of teachers were measured with the help of cognitive preference examination (CPE) (Atwood, 1971). The investigator himself constructed a cognitive preference profile (CPP) for measuring the cognitive preferences of the students to collect the required data. The three modes of preferences were memory, application and questioning as those of Atwood's CPE-II. The CPP was administered at the beginning and then again at the end of the year. The other variables selected were text (enquiry and non-enquiry) teacher's cognitive preferences, students' achievement and sex.

Findings : The findings of the study were as given below :
1. Males and females respond to enquiry and non-enquiry text in the opposite manners.
2. Cognitive preferences of teachers have no significant affect on

2.   The two groups which were least affected by the type of text
       were low achievers (males only) and high achievers
       (females only).

3.   Boys belonging to different levels of achievement tended to
       demonstrate equal preferences for A whereas, girls varied
       in preferences between achievement levels.

4.   Different combinations of sex of students, achievement
       level, type of text used result in different students' cognitive
       preference outcomes in one area of social study (Texas
       History).

2.09. In order to determine the effect of teachers mode of cognitive
       preferences on students' achievement, James (1976)
       conducted a study, 'Effect of students' and teacher's
       cognitive preferences on achievement in Junior High
       School Mathematics.'

       Objectives : The study was conducted with the following
objectives :
1.   To investigate the interactional effect of teacher's and
       students' cognitive preferences on their computation or
       concept formation ability and total mathematics achievement
       in 7th and 8th grade.

       Procedure : Fourteen teachers and 295 students were clas-
sified according to their cognitive preferences on the basis of their
scores on the cognitive preferences test (mathematics). During
the first week, a shortened version of the mathematics
computation and concepts sub-tests or S.R.A. achievement
series from 'E' red level, was administered to the students. The
same test was administered for the second time after the gap of
four months. The data were analysed with a 2 x 3 analysis of
covariance (ANCOVA) model.

       Findings : The findings of the study were :
1.   The interaction between teacher and student's cognitive
       preferences does not have a significant effect on their
       computation or concept achievement or on total mathemati-
       cal achievement.

the computation achievement or total mathematics achievement of 7th and 8th grade students.

2.10. A study entitled, 'A profile into the superior performance of girls in their university examination in India was conducted by Dr. Dinesh Chandra (1984).

Aims and Objectives of the Study

The study aimed at finding out the factors i.e. Intelligence, Socio-economic status, Advantageous home, Perseveranceand
Cognitive styles etc. which account for the superior performance of girls in their university examinations.

Sample : The sample consisted of 200 students in each of the two groups of boys and girls offering Physics, Chemistry, Botany and Zoology at undergraduate and post graduate levels.

Procedure : For collecting the relevant data the following tools were used:

1. An attitudinal scale developed by the researcher on Likert's model, accommodating statements of biases as held upon the phenomenon of better performance of girls in collegiate examination.

2. A perseverance scale to study the degree of perseverance of the students.

3. A non-verbal form of Pegion's test, standardized and adapted by a team of R.B.S. College, Agra, to find out intelligence of the students.

4. An instrument to measure status index.

5. Three sets of cognitive preference styles test, developed on Heath's model to ascertain cognitive preference styles of the students. The four modes of preferences taken were: 'Recall', 'Principle', 'Questioning' and 'Application'.

Findings : The structural explanations which were sought in the attitude study of girls, boys, teachers and parents, it was found that all except boys agreed upon the futility and incorrectness of the charges that evaluation was frequently biased in favour of girls. The parents displayed ignorance of the knowledge of any such bias. The teachers and parents found girls more regular, more adjusted and more suited in temperament for studies. Because of the above attributes, superiority of women over men was found to be real.

The socio-cultural explanations were also investigated in the study of perseverance and cognitive preference styles.

2.11.   Tamir (1965) conducted a study : 'Are Cognitive Preferences just an expression of cognitive abilities ?'

Objectives :   The main purpose of the study was   to investigate whether   cognitive   preferences R P A and Q were expressions   of cognitive behaviours at the levels of knowledge, comprehension and higher abilities.

Sample : The sample was of the following three types :
1)   Sample I (n= 989) which represented Biology majors who followed a different curricula.

2)   Sample II (n≈326) which represented students who studied traditional chemistry.

3)   Sample III (n=341) which represented students who followed a CHEM study course.

Procedure : Two cognitive preference tests, one in Chemistry and one in Biology were used to collect data related to the cognitive preference scores.

Achievement in Chemistry was measured by a Hebrew trans- lation of ASS-NSTA cooperative Chemistry test in High School Chemistry form 11969   part I. Achievement in Biology was measured by a thirty item multiple choice test covering major Biological topics.

Findings
1.   It was investigated that cognitive preferences are independent of cognitive abilities. Cognitive preferences represent a

different type of objectives namely, those evidenced by what the student typically do. These are the attitude, interest, cognitive style type of objectives.

2. It was observed that the cognitive preference areas form two factors. As far as Chemistry is concerned, one factor is represented a Q --> R dichotomy while the other factor represented a P --> A dichotomy. In Biology, one factor is represented by dichotomy between Q on the ·one hand and R, P on the other, while the second factor was positively loaded with Q and A and negatively loaded with R.

3. Consistent interrelationships among the cognitive preference areas themselves, was found i.e. the dichotomy between preference for Recall on the one hand, and critical question, on the other.

2.12. Williams conducted 'A study of cognitive preferences in the year 1976.

Objectives : Specifically, the aims of this study were :

1. To derive measures of cognitive preferences in three separate scholastic areas : Science, Social Studies and Mathematics.

2. To determine whether cognitive preferences as measured by this procedure are pervasive across these subject areas or are subject specific.

3. To examine the nature of the constructs so derived in terms of their relationships to other cognitive measures (academic aptitude, cognitive style, rote memory and subject knowledge).

Sample : The sample consisted of 122 students of Psychology (85 female and 37 males) from the university Iowa, two Augustana College, first group consisting of 34 students (32 female and 2 male) who were majoring in business or in accounting, second group consisting of 20 students (15 males and 5 females) of organic chemistry, 28 specializing in fashion merchandising and

27 females preparing for careers as dental assistants from Kirkwood Community College.

In all there were 231 students included in the study (82 male and 149 female).

Procedure

1. Development of the Cognitive preference Test

Test format : Heath's model of cognitive preference was adopted with certain departures :

1.   Only three preferences i.e. : (i) preference for facts and terms, ii) preference for fundamental principle, iii) preference for practical applications, were retained.

2.   Instead of asking the students to choose the response they preferred, they were asked to rate each response on a 6-point scale according to the likelihood that it would occur to them on being presented with the stimulus information.

Test construction : A cognitive preference test (CPT) in science, mathematics and social studies was constructed.

After constructing all the test items, it was submitted to a panel of judges to determine whether the item responses fit the particular constructs for which they were written to represent. There were 103 items in the final item pool arranged according to the subject. Each subject was answered by 200 students representing a wide range of disciplines, from the university of Iowa and Kirkwood community college, Cedar Rapids, Iowa.

The major criterion of item reliability in terms of internal consistency was the product moment correlation between the item responses and the total score for the scale. The test-retest reliability was also calculated. The item analysis demonstrated that there was consistency in the way students respond to items. As the test was felt to be a long one, therefore, twenty items from each test were selected for the final composite. The criteria for selection was the item content. A wide coverage was sought and duplication of content was avoided. The ordering of the items was determined by random allocation subject to the following restrictions :

1. No more than two items from the same subject should fall consecutively.

2. The last fifteen items should contain an equal number from each subject and these should be evenly distributed.

Findings

1. No statistically significant sex difference were found on any of the scales of cognitive preferences.

2. Cognitive preferences were unrelated to sex.

3. Comparison of CPT scores for groups with different academic orientations, it was found that for two of the subjects---science and mathematics, there was a significant interaction between the groups and their usage of the three preferences, but no significant differences between preference scores were found for the business or fashion merchandising groups.

The dental assistant group scored highest on the 'Principle' scale', but in liberal arts and science groups there was no significant difference between 'Fact' and 'Principle' On the mathematics group the interaction was not as pronounced. In social study group the 'Application' scores were significantly lower than 'Fact' and 'Principle' scores. Thus it was concluded that differences between the groups vary with the contents of the tests.

When the relationship between the preference scales were examined, they were found to be quite consistent for all the three subjects. 'Application' scores were the lowest on all occasions, significantly lower than both 'Fact' and 'Principle'. While except for mathematics test, there is no significant difference between 'Fact' and 'Principle' scores. Thus it was concluded that though the scales are affected by subject knowledge, the relationship between the preferences remains stable.

Relationship of cognitive preference to other variables : (1) CPT scores were unrelated to rote memory. (2) CPT scores were unrelated to cognitive styles. (3) No significant relationship between CPT, scales and academic aptitude was found.

2.13. Another study in this field, 'Development of Cognitive Preference Examination Utilizing General Science and Social Science Content' was undertaken by Atwood (1971).

Objective : The objective was to develop a test of cognitive preferences in science and social sciences. It marks a progress in the development of a cognitive preference examination.

Procedure : A cognitive preference test known as CPE-11 was constructed on the following lines :

The content of the test was drawn from general science, social science and closely related fields. Interviews with students completing a preference test was taken to reduce the number of preference options from four to three and few distractor items were included. Thus the principles option, judged to be generally less distinct than the other options, was eliminated from the four initially used by Heath.

Next, a pool of 34 items was presented to a panel of judges, who keyed each option independently and suggested content changes for greater accuracy and clarity.

The 34 items were administered to four groups of students enrolled in four different courses, in the college of education, university of Kentucky. An item was considered to be functioning poorly if one or more of its options were chosen by a relatively small or large proportion of students. The selected items were administered on a test retest basis with a two week interval. Considering the nature and length of the test, this method of obtaining reliability (or stability) information was considered most appropriate.

Of the 27 preference items of CPE II, eleven utilize content from science, eleven from social science and five from content closely related to science and/or social science. The administration time was 20 minutes.

STUDIES RELATED TO COGNITIVE STYLES

2.01. A study in the field of cognitive style, 'Cognitive Style and Intra-Individual Variation in Abilities' conducted by Donald M. Braverman (1960).

Objectives : The main purpose of the study was to find out intra-individual (as contrasted with inter-individual) variations in students cognitive styles and their effects on their performances of conceptual and perceptual motor tasks.

Sample : The sample consisted of 35 members of a local Church of Worcester state belonging to different levels of socioeconomic status. Their education varied from 5 to 19 years, with a median at 11 years and age ranged from 24 to 50 years with a median of 36 years.

Procedure : The following tests were administered for collecting the required data:

1. The Primary Mental Abilities (PMA) verbal meaning sub-test was used for testing concentration demanding conceptual behaviours.

2. The word colour interference test.

3. The primary mental abilities (PMA) space sub-test was used as the exemplar of concentration demanding perceptual motor behaviours.

4. Speed of naming pictures of common objects was selected as exemplar of automatized conceptual behaviours.

5. The number of taps in a 15 second period was taken as the exemplar of automatized perceptual motor behaviours.

Findings

1. The mean performance level of concentration demanding subjects (CDSS) was significantly above that of the perceptual motor dominant subjects (PMDSS).

2. In PMA verbal meaning sub-test, the mean performance levels of the CD subjects were higher than the PMD subjects.

3. In PMH space subtest the PMD subjects performed better.

4. In automatized conceptual task (object naming) the strong automatization subjects (SA) performed above the weak automatization subjects· were below their mean level of performance.

5. In automatized perceptual motor tasks the SA subjects performed above and WA subjects below their mean levels of performance. Again in this test the PMD subjects performed above and CD subjects below their mean performance levels.

2.02.   Another study, 'Individual Differences in Cognitive
          Styles and the Guidance Variables in Instruction'
          was conducted by John G. Thornell (1977).

Objectives of the Study : The study aimed :

1.   To determine the relative efficacy of two instructional
       treatments (varying in degree of written guidance provided)
       to students having analytic and global cognitive styles.

2.   To examine the comparative performance of the students
       with dissimilar cognitive styles on each of the two instructional
       objectives.

Sample : The sample consisted of 60 Anglo fourth grade
students from a predominantly middle class elementary school in
central Texas.

Findings :   The investigation resolved the following
conclusions :

1.   There exists no significant relationship between the level of
       instructional guidance and individual differences in cognitive
       styles.

2.   Analytic students comparatively performed better than global
       subjects   on conceptual learning tasks, regardless of the
       degree of guidance provided and the instructional mode
       employed.

3.   Differences in cognitive style are significant factors in
       determining the type of individualized instruction program-
       mes which are most beneficial to various students.

2.03. Another study, 'Study of Techniques and Cognitive Styles':
         Their Effect on Recall and Recognition' was conducted by
         J. Kent Davis and Linda Annis (1978).

Objectives : The major aims of the present study were :

1.   To investigate the effect of study technique (reading,
       underlining and note-taking).

2. To find out interrelations between cognitive styles (field independent and field dependent), study techniques and tests of recall and recognition.

Sample : The sample consisted of 120 students enrolled in either a freshmen world history course or a sophomere human growth and development course.

Procedure : The study was conducted in two sessions. In the first session, a study habit questionnaire was administered after which the students were assigned to either a preferred or non-preferred method of study.

In the second session, students were given a packet of materials individually prepared for them containing instructions for applying their preferred study techniques.

Findings : It was found that -

1. field independent subjects using a non-preferred study technique with no review scored significantly better than field dependent subjects using a non-preferred study technique with no review.

2. Field dependent sub jects using a preferred study technique with no review scored better than field independent subjects using a preferred technique with no review time.

C. STUDIES RELATED TO CONSTRUCTION AND STANDARDIZATION OF ACHIEVEMENT TEST

2.01. A study was carried out by I. Kapoor (1974) with a purpose to construct nd standardise an achievement test in Home - Science. The title of the study was, Construction and Standardization of an Achievement Test of Home-Science.'

Procedure : The try-out form of the test was administered to 550 girls of tenth class from Govt. and private schools of rural and urban areas for item analysis purpose. The final form of the test consisted of 100 items and divided into three sections i.e. physiology, hygiene and home management.

The sample for administration of the final form of test consisted of 4760 girls of tenth class studying Home-Science.

Inter-correlations   between various test elements   were computed which were found to be significant. Percentile norms, stanine norms and 't' scores were also computed.

Reliability of the test was calculated by split-half and rational equivalence methods. Validity of the test was established against the criterion of examination of test contents by experts, teachers' judgments and examination scores. Item validity was established against the criterion of the total scores. Cross validation was done on a sample of 350 students who were not included in the standardization sample. The validity of the test established   against the criterion marks   and   quantitative judgements of teachers were 0.893 and 0.836 respectively.

2.02. Another study in this field, which has been reviewed by the investigator is the one conducted by S. Garg (1974). The study entitled, 'Standardization of Achievement Test in Home-Science at the Secondary Level'.

Objectives : The purposes of the study were to standardize an achievement test in Home Science and also to establish norm for the students of High Schools of U.P. State.

Procedure : The sample at the try-out stage consisted of 400 students randomly selected from groups formed on the basis of their pass percentage in their internal examination. The sample at the final draft consisted of 3,000 students secured through proportionate stratified sampling technique.

The final draft of the test consisted of 200 items selected on the basis of difficulty value and discriminative index. The time limit for answering the test was 90 minutes.

The reliability coefficient by split-half method was 0.86. The distribution of the scores was tested by chi-square, goodness of fit test and by method of moments. Docile norms, stanine and 't' scale norms were developed.

In introducing standards for this test, the method followed was that proposed by M. Varma. The adoption of this new technique showed separate distributions on the test score variable of the three groups falling in criterion measure between 0.32 (fail).

33.44 (third), 45-59 (second) and 60+ (first). Then the percentile on test scores were calculated for all the four distributions. These set the standards for each group in test score terms.

D. STUDIES RELATED TO HOME ENVIRONMENT

2.01   The first of the study of this kind, reviewed by the investigator is that conducted by Pauline A. Jones (1972). This study is entitled as 'Home Environment and the Development of Verbal Ability.'

Objectives : The chief objectives of the study were to examine variables of home environment in relation to differences in children's cognitive development and development of verbal ability.

Sample : The sample of the study comprised of 25 pairs of boys of sixth grade in the age group of 10-12 years. This group was selected from the city of Saint John's. Each pair was matched for general intelligence but discrepant with respect to verbal ability.

Procedure : For measurement of environmental variables a 70 minute interview with the mother was taken. The questions related to academic and vocational aspirations and expectations of parents, knowledge of the interests in child's academic and intellectual development and material and organizational opportunities for the use and development of language were asked.

Findings : Mothers of high verbal boys have a higher inter-action index and a higher level of expectations and aspirations for their children in the areas of present and future academic studies and future career.

     Both groups of mothers reported having equal knowledge of how their children were doing in school and reportedly had equally frequent contact with school personnel. The boys of low verbal ability belonged to homes having a significantly lower occupational level.

2.02. Another study reviewed to be presented here is that conducted by Raymond Lee Ownby (1972) entitled, 'A Multi-dimensional Approach to a Theory of Parent Behaviour.'

Objectives of the Study: The major purpose of the study was to investigate underlying dimensional structure of judgements about parent behaviours.

Procedure : The two principal factors of parent behaviours considered were affection -- hospitality and control -- autonomy. The study used alpha-factor analysis hierarchical clustering and multidimensional structure of judgements about parent behaviour. It drew parents behaviours from transcriptions of open ended interviews with parents about their typical behaviours. The study investigated that major aspect of parenting distinct from affection was one labelled as active involvement which includes the activities undertaken to gratify the child's interests such as play or companionship, which were not primarily oriented towards the satisfaction of children's affectional or physical needs or towards controlling the child's behaviour.

2.03. Another study presented here is the one conducted by M.N. Mahale (1979). The study entitled, 'Family Situations and Education of Adolescents.'

Objectives : The main objectives of the study were :

1.   To analyse the relative importance of the economic status or the family to educational and vocational aspirations of the adolescents.

2.   To study the academic achievement of the adolescents in relation to the family situations.

Sample : The sample comprised of all the children studying in tenth standard of all English medium schools of Santa Cruz area and the parents of these children.

Findings : The main findings were as following :

1.   All the parents, irrespective of the size of family extended hospitality to their children's friends and never discouraged their coming home often.

2. About 90 per cent of the parents did not keep themselves informed about progress of their children.

3. Higher the income level, higher was the percentage of parents who motivated their children to study by explaining to them the value of higher education.

As stated earlier four types of studies have been gathered in this file. They are studies on development and... construction of cognitive preference test. Study of Cognitive Thinking and its styles, studies on construction and standardization of achievement tests and development of home environment inventories. The first category studies were related mostly to the development of cognitive preference modes in physics, chemistry, mathematics etc. and also to evaluate the effects of curriculum teachers cognitive preferences, achievement, sex etc. The studies on cognitive thinking styles studies are, somehow a departure from the trend the present study is designed. How an individual's intrafunctional modes vary with regard to conceptual perceptual and motor tasks administered to them. Yet also, how would the degree of written guidance vary with regard to two types of students having analytical or global mode of thinking. So the studies, seeking relationship between modes of thinking and instructional procedure adopted are differed. Yet, another field of studies referred is development of achievement tests in Science and Home Science for High School students. It is just the development of tests wherein reliability and validity indices could be compared with those of the present one. The fourth category of studies, those where in the influence of home and socio-economic status has been sought on the cognitive development of child.

The present study departs from previous investigations that it covers a wider field of investigation. The researcher developed a standard test of cognitive preferences in Home-Science which none of the investigator has hazarded so far. It is a new field where the investigator would have to look into the cognitive competence of women teachers as also the interest and assigned job of women folk as a whole. Although Heath's model has been adopted, yet, the cognitive styles derived may not just amplify the women's

role but the researcher   intends   to   find something new and significant.

The researcher further explore the impact of educational achievements, socio-economic statuses and home environment on the cognitive development of school going girls across 13, 14, 15, 16, 17 and 18 years. These studies have been conducted under reference.

3

The Plan and Procedure of the Study

The plan of research study entails a picture of the considerations of how the work is to be executed and evaluated to see if the goals have been achieved in right earnestness. It is at this stage that decisions regarding the ways and means to be adopted for the collection of the data, for the development of proper tools, for defining the population and samples, controls to be applied and statistical techniques to be used, are taken. Planning is indeed an important step for the conduct of the research work. Without an intelligent planning, the difficulties to be encountered during the process of the work can not be anticipated and resolved. In fact the successful completion of the study without pre-planning becomes not only difficult but well-nigh impossible. A considered discussion of all these steps in respect of present study has been embodied in the present chapter.

The present investigation is designed to study the cognitive preference styles of school going students in Home Science with regard to Age, Achievement, Home Environment and Social classes. As such the prime objective in the first phase of the conduct of this work was to develop a 'Cognitive preference measure', a 'Measure for Achievement, a 'Measure of Home Environment' and a 'Measure of Social Class'. In the second phase the researcher's intentions were defined in terms of collection, analysis and interpretation of the data. To accomplish this, the researcher adopted the following steps for the development of her research tools.

1. Development of the Test of Cognitive preference Styles

This test was developed on Heath's model. This technique involved several lengthy and complex operations which are described separately in Chapter 4.

II. Development of the Achievement Test of Home Science

The development of an Achievement Test for measuring the achievement of the sample subjects in Home Science forms an important part of the present study because one of the objective of the study (No. two, chapter I) was to find correlation between the achievement of students in Home Science and Cognitive Preference Styles. Therefore, the mechanics of construction and standardization of the achievement test in Home Science for High School classes also forms an essential part of this chapter. Achievement test is often referred to as a test having definite set of items in specific course which is taught to the students. It represents 'a terminal evaluation of the individuals status upon the completion of training.' Achievement, as its meaning denotes, is a measure of the accomplishments of the students. Accomplishment here means knowledge, understanding and application aspects of the use of the contents taught, i.e. the student is able to recall or recognise the contents of the subjects, he is able to associate, compare, classify, select, distinguish, seek relationship, make hypotheses etc. and also to apply knowledge into different situations. The process of the development of an achievement test as an instrument for measuring the achievement of students in Home Science involves the following steps :

i) Defining instructional objectives of teaching Home Science to High School students of U.P. State.

ii) Defining instructional objectives in terms of behavioural outcomes of students.

iii) Preparing the blue print, a plan to develop the achievement test in Home Science.

iv) Developing appropriate items on the scheduled plan.

v) Preparing preliminary form of the achievement test of Home Science.

vi) Administration of the test.

vii) Scoring of the test.

viii) Item analysis.

ix) Selection of the items for the final form of the test.

x) Preparation of the final form of test.

xi) Administration and scoring of the final. form of the test.

xii) Establishing reliability.

xiii) Establishing validity, and

xiv) Developing test norms.

I. Defining Instructional objectives of Teaching Home Science

Benzamin S. Bloom has defined six tier Taxonomy of instructional objectives in cognitive domain. His Taxonomy, in an organised form contains the following six major classes :

i) Knowledge.

ii) Comprehension.

iii) Application.

iv) Analysis.

v) Synthesis.

vi) Evaluation.

Taking that analysis is and synthesis were the methods adopted for evaluating a concept. An evaluation, if it is objective-based, is testing of certain objectives defined for instructing the students. Therefore, N.C.E.R.T. in all its evaluation procedures adopted three tier taxonomy of educational objectives namely, Knowledge, Comprehension and Application. Though 'the taxonomy adopted

by NCERT was found to be inadequate for the coverage of cognitive behaviour in measurement of students' achievement, but researcher's mission is not to validate the achievement scores on the basis of cumulative effects of the achievement scores on the basis of cumulative effects of taxonomy. Even otherwise, the three tier taxonomy was found adequate for measurement of students' achievement in Science and Home Science etc. The researcher has accepted knowledge, Comprehension and Application as the three basic instructional objectives of teaching and hence the present test of achievement in Home Science, has also been developed on the three basic tenets of Knowledge, Comprehension and Application. These may specially be defined as:

1.   Knowledge -- Recall or recognition of terms, concepts, facts, processes, principles and generalizations etc. of the content of home Science prescribed in the syllabus of High School Classes of U.P. State.

2.   Comprehension -- Compare, Classify, discriminate, analyse, synthesize, select, identify, seek relationships, give reasons and formulate hypotheses, terms, concepts, facts, processes, principles and generalizations etc. of the contents of Home Science prescribed in High School syllabus of U.P. State.

3.   Application -- Application of the knowledge of terms, concepts, facts; processes, principles and generalizations etc. of the contents of Home Science prescribed in High School syllabus of U.P. State.

II. Defining Instructional Objectives in Terms of Behavioural Outcome of Students

This test was developed mainly on three specific objectives i.e. Knowledge, Comprehension and Application of the contents of Home Science prescribed in the syllabus of High School classes of U.P. State under the following main points :

    i)   Physiology.

    ii) Health, Hygiene and Diseases.

iii) Food and nutrition.

iv) Home Management.

v) First-aid and Home nursing.

vi) Textile and Tailoring.

The instructional objectives defined in behavioural terms are given below :

A. Knowledge : The students will demonstrate working knowledge of the following contents of Home Science -

A) Physiology : The following systems and parts of human body

i) Cell : its parts and types. Tissues.

ii) Skeleton system : Bones and Joints.

iii) Respiration.

iv) Digestion of food.

v) Excretory system : Kidney and Skin.

vi) Circulation of blood : arteries, veins and coagulation of blood.

B. *Health and Hygiene* : Fundamental principles of Health, Air and Water.

C. *Diseases* : Common infections and food deficiency diseases, their causes, symptoms, preventions and cure.

D. *Food and Nutrition* : Food, constituents of food, food for different persons.

E. *Home Management* : Money management.

F. *First-aid and Home Nursing* : First -aid in common ailments and incidents.

G. *Textile and Tailoring* : Characteristics of different types of cloths, Tailoring and its equipment etc.

B. *.Comprehension* : The students will -

a. *Classify*

i) Systems of body.
ii) Juices excreted in different parts of digestive system and enzymes found in them.
iii) Different poisons.
iv) Different cloths.
v) Elements of food.

b) *Discriminate*

i) Parts of body.
ii) Poisons.
iii) Right way of bandaging.
iv) Types of cloth from others.
v) Bleeding from arteries and veins.

c) *Analyse*

i) Elements of food and their uses.
ii) Systems of the body.
iii) Types of diseases.
iv) Enzymes for digestion of food.

d) *Synthesize* : Their knowledge of different branches of Home Science to understand in an integrated way.

e) Select right response from those given under each item of the test.

f) *Identify.*

i)   Different parts and organs of the body.
ii) Blood in arteries and veins.
iii) Correct way of bandaging.
iv) Diseases on the basis of given symptoms.
v)   Germs of different diseases.
vi) Poisons on the basis of given symptoms.

g) *Give reasons for :*

i) Spread of different diseases.

ii) Inclusion of different food items in the diet.

h) Seek relationship between:

i) Physiological Principles and Health and Hygiene.

ii) Health and Hygiene and Diseases.

iii) Textile and Tailoring.

iv) Diseases and first-aid and home nursing.

i) Formulate hypotheses on the basis of their knowledge of Physiology, Health and Hygiene, home manag·ment, textile and tailoring.etc.

C. *Application* : They will apply their knowledge of :

i) Physiology, Health, Hygiene and diseases for keeping themselves in good health.

ii) Nutrition for preparing balanced diets for persons of different age groups and requirements.

iii) Household gadgets and their proper handling.

iv) Home management in conducting various activities of home life.

v) First-aid, home nursing in providing help in accidental occurrings.

vi) Textile and tailoring in proper selection and stitching of their cloths.

The investigator's main objective was to study the cognitive preference styles of High School students in Home Science. The intentions were focused mainly on the development of Measure of cognitive preference styles. The development of achievement test was one of the subsidiary objectives. As no competent test for the measurement of achievement of the students in Home Science was available, the investigator had to undergo the rigours of the development of one such test. To rely upon the test scores, care has been taken to go through the precautions of a good test. Hence nothing has been done to develop the norms of the test.

III. Preparing Blue Print of the Test

The test was developed on the specific contents of physiology, health, hygiene and diseases, food and nutrition, home management, first-aid and home nursing, textile and tailoring prescribed by the board of High School & Intermediate Education, 1983. The statement of the plan or the blue print of the test is given in Table 3.01.

Table 3.01

Test plan for the achievement test in Home Science for High School Classes.

	PHY.	HHD	FN	HM	FA HN	TT	Total
Knowledge	35	15	18	6	8	3	85
Comprehension	15	6	9	4	6	3	43
Application	5	4	2	1	4	0	16
	55	25	29	11	18	6	144

Abbreviations used in Table 3.01 are :

PHY   =   Physiology,   HHD =   Health, hygiene
                                           and diseases
FN   =   Food and nutrition   HM =   Home Management,
FA HN ≈   First-aid and   TT =   Textile and Tailoring
          Home Nursing.

IV. Developing Appropriate items on the Scheduled Plan

The details of behavioural objectives of the test items in general are given along with the objectives specified under the heading; heading : 'Defining Instructional objectives in terms of Behavioural outcomes of the students'. So details of the behavioural outcomes for each of the objectives is not given with the blue print. In all 144 items were constructed. These items are all multiple choice items with a stem followed by one correct and four distractor choices to be correctly opted by the students.

V. Preparing Preliminary Form of the Test

The preliminary form of the test consisted of 144 test items. The format of the test was simple. The items were Compiled with the instructions overleaf. Items were randomly arranged in succession with one after another.

VI. Administration of the Test

An achievement test being a speeded test, was allotted two hours time for answering all items. This prescribed time was enhanced in special cases where the students could not answer all the questions in due time. Care was taken that each one of the item was responded by each one of the students. It helps the test constructor to score all students and all items, thereby, increase the reliability and validity of the test. Although it does not seem justified that loose rope of time should be allowed to the students but in view of the purpose of selecting the items for the test the specified period of two hours was relaxed.

VII. Scoring of the Test

The scoring scheme was simple. A scoring key was prepared which valued each correct response by score of one, and sum total of all the scores was counted for the score of the students. But in this case, the score with regard to each item was to be analysed, the frequencies of the individuals who marked the item correctly was counted and further analysed as per scheme of item analysis.

VIII. Item Analysis

Three measures of item analysis were employed. These were :
   i) Difficulty value,
   ii) Discriminative index, and
   iii) Internal consistency.

IX. Selection of Items for the Final Form of Test

As most item analysis procedures make use of the internal criterion for selecting items for the test, the researcher also depended upon the use of the internal criterion for the selection of the items for the Home Science test.

a) *Difficulty value* : The first criterion for selection of items was difficulty value. Difficulty value has been defined by most of the psychometricians as a measure of the pass percentage of an item. The purpose being to judge the discriminative ability of the item between those who pass or fail the item. The difficulty value thus has been found a competent index to judge between the passes and the failures. The items with maximum discriminations are generally picked up. The item with 50% the discriminations go on decreasing from 2500 to zero. The criteria being maximum of discriminations the items with 40% to 60% pass were selected. The total number of items selected on the basis of difficulty value came to 86. Table 3.02 presents the selected items and their difficulty values.

Table 3.02
Difficulty value of the selected Items

S.N.	Items	D.V.	Items	D.V.	Items	D.V.	Items	D.V.
1.	1	.52	37 ·	.50	72	.55	105	.56
2.	3	.49	40	·.48	73	.52	106	.47
3.	4	.54	43	.49	·74	.46	107	.59
4.	5	.52	44	.51	75	.54	110	.54
5.	8	.49	45	.55	78	.56	113	.59
6.	10	.41	47	·.45	79	.49	115	.52
7.	12	.52	48	.60	80	.56	117	.49
8.	13	.59	50	.60	82	.47	118	.48
9.	17	.55	51	.44	84	.60	119	.48
10.	19	.49	52	.52	86	.89	120	.47
11.	20	.60	55	.59	87	.46	122	.59
12.	22	.55	56	.51	88	.48	123	.60

S.N.	Items	D.V.	Items		D.V.	Items	D.V.	Items	D.V.
13.	23	.49	57	,	.42	89	.60	124	.56
14.	24	.48	58		.50	90	.43	125	.52
15.	25	.52	59		.60	91	.43	126	.48
16.	26	.60	61		.55	93	.59	129	.49
17.	28	.60	63		.48	94	.58	132	.55
18.	29	.58	65		.49	95	.60	135	.48
19.	30	.58	66		.48	96	.40	138	.49
20.	31	.50	67		.40	99	.45	142	.50
21.	34	.59	69		.58	102	.59		
22.	35	.58	70		.52	103	.53		

D.V. = Difficulty value.

Discrimination Index

Another measure used for screening out the test items was the Index of item discrimination. It is also an internal criterion. Two groups of high and low achievers were selected comprising 27% of those who achieved highest and 27% of those who achieved the lowest. Thus out of a sample of 200 students the present sample of discrimination consisted of 54 students in each of the two groups. The criterion being discrimination between the high and low achievers, each one of the items was analysed for discrimination between high and low achievers. If 'n' was the number of students who passed the particular item from high achievers and 'L' from the low achievers, then N-L would be the Item Discriminative Index. With this Index the test constructor selected items with or beyond .24 discriminative index. This analysis was done for all the items. Thus the total number of items selected on the basis of Item discrimination Index were 60.

The selected items along with their discrimination Index are given in the Table 3.03 on the next page :

Table 3.03

Items selected on the basis of Discrimination Index:

S. No.	Item Nos	D.I.	Sl. No	Sl. Nos	D.I	SI No	Item Nos	D.I.	Sl. No.	Item No.	D.I
1.	3	.36	16	29	.37·	31	58	.45	46	86	.40
2.	4	.25	17	30	.36	32	59	.38	47	89	.38
3.	5	.44	18	31	.31	33	61	.36	48	90	.38
4.	8	.37	19	34	.32	34	63	.24	49	91	.28
5.	10	.26	20	35	.33	35	65	.28	50	96	.27
6.	12	.27	21	37	.33	36	66	.43	51	99	.24
7.	13	.35	22	43	.37	37	67	.37	52	106	.26
8.	19	.37	23	44	.25	38	69	.38	53	107	.37
9.	20	.40	24	45	.24	39	70	.25	54	120	.38
10.	22	.70	25	47	.37	40	72	.24	55	124	.37
11.	23	.25	26	48	.38	41	78	.47	56	126	.45
12.	24	.28	27	50	.26	42	79	.42	57	129	.48
13.	25	.27	28	51	.27	43	80	.41	58	132	.42
14.	26	.28	29	52	.24	44	82	.42	59	138	.47
15.	28	.25	30	57	.28	45	84	.39	60	142	.37

c) Internal Consistency of Test Items

Ascertaining internal consistency of test items is a procedure for validating the item to see that the items measures what the total test is intended to measure. To accomplish this objective the researcher correlated scores on each of the items with the total test scores. A consistency table was prepared. An amount of consistency correlation so obtained are given in Table 3.04.

Table 3.04

Internal consistency of the selected items of the Test of Home Science.

	Item	Corr.	Item	Corr.	Item	Corr.	Item	Corr.
1.	3	.60	29	.64	58	.60	86	.80
2.	4	.73	30	.80	59	.80	89	.80
3.	5	.72	31	.68	61	.78	90	.78
4.	8	.80	34	.72	60	.75	91	.65
5.	10	.62	35	.60	65	.76	96	.67
6.	12	.80	37	.74	66	.75	99	.80
7.	13	.68	43	.78	67	.80	106	.80
8.	19	.65	44	.80	69	.65	107	.72
9.	20	.80	45	.75	70	.60	120	.75
10.	22	.78	47	.65	72	.62	124	.76
11.	23	.70	48	.60	78	.64	126	.80
12.	24	.65	50	.63	79	.65	129	.65
13.	25	.69	51	.70	80	.70	132	.69
14.	26	.70	52	.80	82	.75	138	.68
15.	28	.78	57	80	84	.76	142	.70

It is not surprising to note that each one of the item was found to be highly and significantly correlated with the total test scores as shown in the Table 3.04. This lead the researcher to conclude that each item of the test is measuring the students' ability in Home Science as defined under instructional objectives. Therefore, the test can be relied for valid measure. The observation of the table discloses that none of the items selected was rejected on this criterion. The test was a true measure of what it intended to measure .

X. Preparation of Final Form of the Test

As none of the items was rejected on the measure of internal consistency the final form consisted of 60 items in the test. Random sequence was adopted in assembling the easy and difficult items. This was done with the purpose to provide a motivation to the children by interspersing easy questions through-out the test and thus creating in them a desire to pursue the test upto the end. Multiple choices in items were also placed in a random order. Separate answer sheets were prepared. Specific directions were written for the students. They were asked to go through the instructions before they attempted the test. In the directions, the instructions to record the answers in the answer sheets were also given.

XI. Administration of the Test.

With a view to collect the required data, the final form of the test was administered to a sample population of 600 students of High School classes of Agra City. The scoring of the answer sheets was done according to the scheme mentioned earlier.

Reliability of the Test Items

It is a fact that reliability depends entirely on average correspondence among items and also on the number of items. These values could be substituted to obtain the reliability of a particular test.

In practice, however, it is tedious to compute all correspon-dence among items or among other units being summed. There

is much easier way to get much the same results. The well known equations (formula 20 and 21) could be used to overcome the difficulty of finding all correlations and then averaging them. These well known equations for estimating reliability are given below :

$$\text{Reliability Index} = \frac{n}{n\text{-}1} \left(1 - \frac{\text{Epq}}{S^2 t} \right)$$

'n' is the number of items in the test.

'p' is the proportion of subjects passing the items.

'q' is the proportion of subjects failing the item.

'$S^2 t$' is the variance of the total test score.

The formula gives a measure of internal consistency and also stability of the item.

The internal consistency measure does not supply a very high index of variability. In the present case also, the reliability so obtained for the present achievement test came out to be .64. This value is significant enough to give the estimate of reliability and the researcher can with full confidence depend upon the present test.

Validity of the Test

A test is said to be valid, if it measures what, it is proposed to measure. The validation of a test in terms of test scores imply the utilization of regular school marks; likeness or differences of performance as indicated by the scores made by groups showing wide difference in ability; progression in success, in terms of percentage from grade to grade or age to age, extent of agreement with the results of other tests.

In the present case the investigator, in order to ascertain the actual effectiveness of the test, collected their marks obtained in Home Science at the final examination and correlation between two scores was calculated which came to be .89. Thus the investigator ascertained the validity of the test.

DEVELOPMENT OF SOCIAL CLASS SCALE

The researcher has been very scientific in her approach in developing social class scale, a tool to measure the socio-economic status of the students for the present project. The following steps were adopted in the development of the scale :

1. Elicitation of status components.
2. Development of status scale.
3. Preparation of the preliminary form of the scale.
4. Try-out of the status scale and scoring.
5. Selection of components of the scales.
6. Preparation of the final form of the scale.
7. Administration of the scale.
8. Ascertaining validity of the scale.

ELICITATION OF STATUS COMPONENTS

The material that elicited status components consisted of a Questionnaire. It was handed over to twenty expert educationists who had a good experience of working upon different status scales. They were requested to elicit the attributes of social status of an individual. Almost similar components of status that determine the social class were derived. These components numbered 17 in all. These are given below :

1. Occupation.
2. Education.
3. Income.
4. Social class.
5. Social participation.
6. Place in community.
7. Specific recognitions.
8. Material possessions.

9.   Caste.

10. Sacrifices.

11. Contributions made for the country.

12. Status of relatives.

13. Schools and colleges attended.

14. Size of the family.

15. Weapons and Licences in the family.

16. Income Tax Payee.

17. Dwelling place.

(2) DEVELOPMENT OF STATUS SCALES

Table 3.05 displays the frequency counts and scores of the experts
with regard to the components elicited:

Table 3.05

Frequency counts and scores for each components of Social class scale.

S. No.	Social Class Scale	Frequency	Score
1.	Occupation	20	10
2.	Income	20	12
3.	Education	18	07
4.	Social class	10	03
5.	Social participation	12	04
6.	Place in community	17	04
7.	Specific Recognitions	15	04
8.	Material possessions	18	10
9.	Caste	15	04
10.	Sacrifices	16	02
11.	Contribution made for the country	16	02
12.	Status of relatives	17	02
13.	Schools and colleges attended.	10	04
14.	Type and size of the family	13	02
15.	Weapons and licences	10	04
16.	Income tax payee.	12	04
17.	Dwelling place	10	04

3) Preparation of preliminary form of the scale

The experts were again invited to edit the components which in their opinion were irrelevant or inconsistent. The consensus of editing evolved a total number of 8 components, eliminating, thereby, the nine of the components. The final form is provided below :

S.No.	Components selected	Components deleted
1.	Occupation	Social class.
2.	Education	Social participation.
3.	Income	Place in the community.
4.	Other material possessions	Specific recognitions.
5.	Caste	Contributions made for the country.
6.	Sacrifices made for the country.	Schools and colleges attended.
7.	Status of relatives.	Size of the family.
8.	Dwelling place.	Weapons and licences in the family.
		Income tax payee.

Preliminary form of the test

These components were reorganized under five broad heads :

1. Occupation.
2. Income.
3. Education
4. Recognitions   : Caste
                        Sacrifices made to the country.
                        Status of relatives.
5. Useful resources : Dwelling house.
                        Other resources.

Each one of these broad categories were assigned levels with minimum of three and maximum of nine. It was done with the unanimous approval of the team of experts and these levels constituting the scale were interwoven under the five broad heads mentioned above.

(4) TRY-OUT OF SCALE AND SCORING

The preliminary form of the scale with the instructions given
overleaf was administered to a population of one hundred
students. It was then scored in accordance with the scoring
scheme.

(5) SELECTION OF THE COMPONENTS AND THE SCALES

The simple statistical techniques were applied to study
overlap among the scales. A cluster analysis of the components of
these scales were also done with a view to finally select compo-
nents of the scale. The inter-correlation matrix and cluster analysis
of the scales is given in Table 3.06.

Table 3.06

Inter - correlation matrix and cluster analysis of social class
scales.

Occup-ation	Monthly Income	Educat-ation	Caste	Sacrifi ces made to the country	Status of to the Relatives	Other resources
I 0.657	0.362	0.320	0.122	0.152	0.244	0.470
I	0.209	0.195	0.038	0.039	0.286	0.461
	I	0.214	0.053	0.149	0.179	0.25
		I	0.072	0.007	0.095	0.261
			I	0.369	0.06	0.155
				I	0.061	0.155
					I	0.358
						I

(6) FINAL FORM OF THE SCALE

The final form consisted of eight components i.e. occupation,
income, Education, Caste, Sacrifices made to the country, Status
of Relatives, House and Other resources which were grouped
under five broad categories.

(7) ADMINISTRATION OF THE SCALE

To collect data for the present study the final form of SCS with necessary instruction printed overleaf was administered to the selected sample of 600 students. The scoring of the answer sheets was done according to the scheme mentioned earlier.

8) RELIABILITY OF THE SCALE

In order to ascertain reliability of SCS Scale the same scale was administered for the second time to a sample of one hundred students after a gap of one month. The sample was randomly selected and scoring was done in a similar way. A product moment correlation coefficient computed between test - retest scores was as given Table 3.07.

Tabel 3.07

S.No.	Components	Coefficient of Correlation.
1.	Occupation	0.94
2.	Income	0.95
3.	Education	0.97
4.	Caste	0.98
5.	Sacrifices made to the country	0.96
6.	Status of relatives	0.97
7.	House	0.98
8.	Other resources	0.95

The indices so obtained were tested for the significance which indicated that their reliability indices were significant for all the components separately as well as for the whole test.

(9) VALIDITY OF THE SCALE

To establish validity of the present scale the score obtained by students of randomly selected sample were correlated with the scores obtained by these students on Kuppuswamy's SES scale.

The coefficient correlation between these two scores was found to be 0.896 which clearly indicates that the scale developed by the researcher is significantly valid.

DEVELOPMENT OF HOME ENVIRONMENT INVENTORY

Child's behaviour, attitudes and achievements are markedly influenced by the family in which the child is born and where he grows up. Because home is the child's first environment, it not only sets the pattern of attitudes and adjustments of life in general but also of achievements and cognitive modes, etc. For many years psycho-analysts have stressed the importance of early family experiences on child's behaviour and attitude. Frued, Flugel Strecker etc. have stressed that psychological damages are caused by maternal dominance or over protection. In problem children the importance of family relationship has been very well determined by T. Garden (1946), Field (1940), and Jackson (1950) etc. Highberger was of the opinion that the degree of adjustment of children that they make outside their home is markedly influenced by the type of relationship they have in the home. The researcher was of the opinion that the cognitive styles of the students are markedly influenced by home environment in which they are reared. With this hunch in mind and that no efficient and competent test on home environment was available, the researcher developed her own test of home environment on the following steps :

1.   Eliciting factors of Home Environment Inventory
2.   Developing behaviours related to those factors
3.   Preparation of preliminary form of the inventory
4.   Administration of the preliminary form of the inventory
5.   Scoring of the preliminary form of the inventory
6.   Selection of scales for the final form of inventory
7.   Developing final form of the inventory
8.   Measuring reliability of the inventory
9.   Measuring validity of the inventory
10. Developing test forms

(1) ELICITATION OF THE FACTORS OF HOME ENVIRONMENT INVENTORY

The investigator circulated papers to 40 experts. They were reputed personnels in the field of educational sociology and psychology and professors in various colleges and departments of education. They were requested to report the factors that constitute home environment. The following factors reported by the experts are presented below with the frequency counts:

S.No.	Factors	Frequency counts
1	2	3
1.	Recognition of child as person	39
2.	Care for the child	28
3.	Observance of family traditions	38
4.	Parental aspirations for the child	36
5.	Forbearance for child's wishes	39
6.	Praise for obedience	20
7.	Anxieties about the child	28
8.	Encouragement for initiative	36
9.	Reproaches and punishments for undesirable behaviour.	34
10.	Permissivenes for sleeping time	34
11.	Encouragement to leadership	29
12.	Explaining undesirability of lie	30
13.	Forcing the child to complete any work	34
14.	Parental affection	39
15.	Discouraging dependency in children	38
16.	Indoctrination	39
17.	Affectionate behaviour of father	36
18.	Encouragement for initiative	25
19.	Parental care	20
20.	Freedom	29

The list of twenty factors was too large to prepare the test and also an overlap of factors was suspected. The proper way was to elicit behaviours with regard to each of the factors and then to

eliminate the factors which have common meaning. Instead the researcher again invited the experts to edit the factors with the same meaning. They were directed to make the list more comprehensive with regard to areas that constitute home environment and see that each one of the factors is discrete and represents a relevant area of home environment. Thus the list of factors finally selected was evolved by the common consensus of the experts which is given below:

S. No.	Factors
1.	Recognition of child as person
2.	Praise for obedience.
3.	Care for the child.
4.	Observance of family traditions.
5.	Forcing the child to complete any given work
6.	Parental aspirations for the child.
7.	Forbearance for child's wishes.
8.	Anxieties about the child.
9.	Reproaches and punishments for undesirable behaviour.
10.	Explaining undesirability of lie.
11.	Parental affection.
12.	Indoctrination.
13.	Encouragement for initiative.
14.	Freedom.

II. DEVELOPING BEHAVIOURS RELATED TO THOSE FACTORS

The fourteen factors given above were then assigned behaviours defining the meaning of the factors.

III. PRELIMINARY FORM OF THE TEST

The preliminary form consisted of 77 behavioural statements that consisted the try-out test. The behavioural statements were arranged in the try-out form randomly without any regard to sequence or the arrangement of the factors.

IV. ADMINISTRATION OF THE PRELIMINARY FORM OF HOME ENVIRONMENT INVENTORY

The preliminary form was administered to a sample of seventy-five students. For this purpose the sample was selected randomly from classes IX and X of St. Joseph's Inter College, Wazirpura, Agra and Anglo Bengali Inter College, Agra. The selection of school was arbitrary. For standardization purpose any· of the student from and school could be selected, taking care the requirements of the student reading in high school classes was sufficient. Because, the sample was selected randomly, it was presumed that the three levels of socio-economic status of students were represented in the sample. Therefore, the researcher was justified in selecting the sample from only the two schools mentioned above.

The students were asked to go through the following instructions which were printed overleaf before attempting the items of the Inventory.

Instructions

The Home environment inventory contained the following instructions:

In the pages that follow, some statements, related to you or your parents' behaviours are given. Do not write any thing on the booklet. Separate answer sheets are also provided with five points scale against each number of the item. Please recollect that you or your parents would have indulged in these behaviours 'Always', 'So often', 'Some times', 'Rarely' and 'Never'. The purpose of this scale is not only to measure the contents of attitude but also the intensity of attitude displayed by you regarding your home climate. The five words denote the intensity of favour or disfavour of the two sides of a neutral point. You are required to put a tick mark (✓) against each statement on any of the five points of scale consonent to the favour or disfavour you show towards each of these statements. Give your views without any hesitation. Your views will be kept secret and will only be used for improving the teaching and learning of the students. Don't copy from others.

If you find certain items difficult to reply, put a question mark at the right hand side of the item number in your answer sheet.

V. SCORING OF THE PRELIMINARY FORM OF IN-VENTORY

A score of 'one', to 'five' was assigned to each point of continuum from the point of 'least favour' to the 'most favour. Thus, each tick mark with regard to each statement was scored. The scores so obtained were pooled with respect to the individuals for each scale. Thus inter-correlations were computerized.

VI. Selection of scales for final form of Home Enviornment Inventory

The next step in the construction or development of a tool after inter-correlations were obtained, was to reject the statements which were found to overlap each other. From the statements giving the same meaning one was retained and rest were eliminated on an arbitrary criterion of correlation index 0.33. This index was taken to be a cut point and all the statements having coefficient of correlation more than 0.33 were rejected. Dr. Osgood, in a study on occupational preferences selected qualifiers which were found to have as low Phi as 0.95. Dr. Dinesh Chandra, in a similar study selected qualifiers on the criterion of 0.33. In the the present study, the researcher's mission is some how different. She has to select statements rather than the qualifiers and instead of Phi, she got Product moment correlation computed. This decision to discard statements that have coefficient of correlation more than 0.33 is very well supported by Dr. Osgood as an evidence. Dr. Wiliam May's letter may be recorded in which he writes, " the criterion we used Phi as 0.295 because this value regularly selected 60 to 70 qualifiers... occasionally we used high Phi, say $P = 0.1$ since, we used it as an arbitrary criterion. " He further writes, that "any criterion will do that would yield 60 to 70 qualifiers."

The present study intended to select about 50 statements. The criterion of 0.33 index evolved 48 statements, which could easily fulfil the exact requirement of the present study.

The chosen index of 0.33 of correlation coefficient was justi-fied in another way also. It accounts for 10 per cent of variance only. Therefore, the researcher was justified in choosing a criterion of 0.33 for selecting or rejecting the items.

Scale Factor Analysis

The inter-correlation matrix was further computerized for factor analysis. In all, 12 factors were obtained. Table 3.09 describes factor loading with scales.

Table 3.09

Showing rotated factor matrix obtained on cluster analysis of the selected scales of Home Environment Inventory.

Scale S. No.	Origi-nal No.	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.
1.	1				.59								
2.	2					.66							
3.	3						.70						
4.	4	.50											
5.	6											.50	
6.	8										.66		
7.	9	.80											
8.	11				.68								
9.	12				77								
10.	13									.62			
11.	15					.72							
12.	16											.52	
13.	17	.48											
14.	18		.65										
15.	19										.67		
16	20											.60	
17.	21												.50

Factors Scale S. No.	Original No.	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.
18.	22											.58	
19	23										.77		
20	24		.82										
21.	25												.63
22.	26					.64							
23.	28			.72									
24.	29			.66									
25.	32								.67				
26.	34				.51								
27.	35	.62											
28	38				.79								
29.	39	.51											
30.	40						.62						
31.	43							.82					
32.	44									.82			
33.	45					.55							
34.	46			.60									
35.	48								.89				
36.	50							.88					
37.	51				.66								
38.	52			.59									
39.	54				.72								
40.	55			.80									
41.	59						.67						
42.	62				.66								
43.	63	.58											
44.	64	.70											
45.	66						.72						
46.	71												.61
47.	73					.88							
48.	75												.54

For selection of the scales for the final form a loading of 0.45 or above is taken as significant for choosing scales for final draft of Home Enviornment Inventory. Though in other studies done with semantic differential technique a criterion of 0.50 or greater was accepted as high and significant.

Kuppuswamy and Agarwal in a paper entitled, "Meaning of Work" considered 0.54 or greater as significant. The researcher feels that 0.45 or above is just significant to ward-off those scales which do not fit into the criterion.

Following a criterion of selection that is significant loading on one factor and not on other, the following two factors were rejected evolving 12 factors which were identified as components of the final form of the test.

1.   Praise for obedience.
2.   Forcing the child to complete any given work.

VII. Developing Final form of Home Enviornment inventory

The final format of Home Environment Inventory consisted of a total number of 48 scales grouped under twelve factors which are given below. :

Factors selected on the basis of factor loadings.:

S. No.	Factors
1.	Recognition of child as person.
2.	Care for the child.
3.	Observance of family traditions.
4.	Parental aspirations for the child.
5.	Forbearance of child's wishes.
6.	Anxieties about the child.
7.	Reproaches and punishments for undesirable behavier.
8.	Explaining undesirability of lie.
9.	Parental affection.
10.	Indoctrination.
11.	Encouragement for initiative.
12.	Freedom.

Thus the selected scales were pooled in the final format of Home Enviornment Inventory by following a lottery system. The 48 items of the inventory were written in random order.

The scales in the final format of the inventory were bi-polar scales with five points like those used in try-out. The title page of the Inventory contains the nomenclature of the Instruments and a set of instructions. The instructions are already detailed in the foregoing pages of the chapter. As they were found satisfactory, the investigator, therefore, realised no necessity to revise the instructions. The final format of the inventory is included in the appendix .(vide appendix III/8.)

VIII. Reliability of the Inventory

Reliability of an instrument is said to be the degree to which the same scores can be reproduced, when same objects are measured repeatedly. The basic score from Home Enviornment inventory is digit value through 5, corresponding to a subjects' check-mark. (✔) with which the individual indicates his judgement of a particular scale.

There are various methods of ascertaining reliability of the tool. But keeping in view the objectives and limitations of the present study and of the compatibility of the work, the researcher limited herself to the conventional psychological approach in the matter of ascertaining item score reliability of the present tool. For this purpose the inventory was readministrated to a sample of 100 students randomly selected from those which were included in the final administration of the inventory. The scores obtained by the sample on this form were correlated with their previous scores. The product moment correlation thus found, was of the order of 0.75 which claims the test to be highly reliable.

· IX Validity of the Inventory

An instrument is said to be valid when it measures what it is intended to measure quantitatively. An instrument is valid to the extent that scores on it correlate with scores on some criterion of that which is supposed to be measured. For this purpose Home Environment Inventory developed by Karuna Shanker Mishra

was administered to a group of one hundred students randomly selected from those that were included in the main sample of the study. The scores on both the inventories were correlated and the coefficient of correlation between the two scores was found to be 0.891 which clearly indicates that the inventory developed by the researcher is significantly valid and purports to measure the nature of home environment of the students.

SAMPLING DESIGN

This investigation intends to study cognitive, preference styles of High School students in Home Science in relation to Age, Achievement, Socio-economic status and Home Environment.

The purpose of this study, therefore, require it to be conducted in two phases :

1) Development of tools, and

2) Administration of these tools to collect the required data.

In each of these phases the problem of the selection of appropriate sample had been an important factor for obtaining valid and reliable results. Adequate sampling design involves a number of considerations such as : nature, and characteristics of the population from which the sample is drawn, accessibility of the subjects chosen, availability of the time and resources at the disposal of the investigator and an appropriateness of the statistical treatment of the data etc. While choosing samples and sub-samples of the study, a careful consideration to all these problems was given to the extent of practicability.

The parameter of this investigation includes only the girls studying in High School classes of Agra City. Therefore, only those girls could be sampled who opted for Home Science as one of the subjects. The population being very large, the investigator had to be selective in sampling the subjects. A random sample was better suited for the accomplishment of present objective. The selection of girls was also obligatory as the subject Home Science can be opted by girls only. With regard to the purpose defined earlier any school could be selected. For the present sample it was tended to select students from High School classes of all mental levels as also of all categories of socio-economic status groups.

Assuming the intended population to be normally distributed a large sample randomly selected from the parameter was proposed to satisfy the requirements of this study.

In all, 600 students were selected from nine schools of Agra city. These schools were selected randomly without any prejudice or bias of any kind.

Table 3.09

List of schools and students selected as sample of the study,

S.No.	Schools	No. of students
1.	Ram Swaroop Singhal Inter College, Agra	151
2.	B.D. Jain Inter College, Agra.	88
3.	Joy Harris Inter College,Agra.	44
4.	Chandra Balika Inter College, Agra	58
5.	Ratan Muni Jain Inter College, Agra.	53
6.	Singari Bai Inter College, Agra.	58
7.	Indrabhan Inter College, Agra.	41
8.	Municipal Corporation Inter College, Agra.	60
9.	Prem Vidyalaya Inter College, Agra.	47
	Total	600

I. SAMPLE USED FOR VALIDATION AND DEVELOPMENT OF COGNITIVE STYLE TEST.

The researcher has proposed to ascertain the concurrent validity of her tool, the cognitive preference style test.

For ascertaining the concurrent validity of test, the researcher approached the Home Science Teachers of High Schools and Intermediate Colleges as well as to Teacher Educators who were experts in the Content-cum-Methodology of Home Science Teaching. The constructed items were presented to them with a request to allocate one of the areas of cognitive preference styles to each options of the item. The items which received approval of the experts were selected for the try-out test. In this way the

concurrent validity was ascertained. It was to collect opinion concurrently delivered by the experts. The total number of teachers and teacher-educators who were approached was ten.

After collecting and editing the preliminary form of the test was prepared which was administered to a sample of 200 students of High School classes. They were randomly selected from the school population offering Home Science as one of their optional subjects. This preliminary form of the test was administered to select items for the final form of the test.

The final form of the test was administered to the total population of 600 students described in Table 3.09.

II. SAMPLE USED FOR ELICITATION OF THE COMPONENTS OF THE SCALES OF SOCIAL CLASS.

In all, 20 expert sociologists and educationists were chosen who had the knowledge and experience of constructing tests. This group of experts consisted of lecturers, professors from colleges of education, departments of psychology and those who served in national Institutions of Education or who have been UNESCO experts in the field. Table 3.10 gives details of the selected sample.

Table 3.10

Experts selected for elicitation of the items of social class scale.

Sl No.	Institutions/ Experts	Male	Female	Total
1.	Dept. of Education,			
	DEI Dayalbagh.	8	8	16
2.	Dept. of Psychology	-	2	2
3.	Retd. Personnel.	2	0	2
	Total	10	10	20

III. SAMPLE USED FOR DEVELOPMENT OF ACHIEVEMENT TEST OF HOME SCIENCE

Sample on whom the test was tried out consisted of 200 students. These students were not included in the main sample of the study. Therefore, those schools which were not included in the main sample were chosen for try-out sample. Any High School student conveniently available in the school premises was taken. Table 3.11 gives a description of the sample for try-out study.

Table 3.11

Sample for try-out of the achievement test.

S.No.	College	No. of students
1.	St. Josephs Inter College, Agra	105
2.	Anglo Bengali Inter College, Agra.	95
	Total	200

IV. SAMPLE USED FOR DEVELOPMENT OF HOME ENVIRONMENT INVENTORY

The investigator used the following samples for the development of the inventory and collection of relevant data for the project :

(a) Sample used for Elicitation of Factors of Home Environment :

The investigator circulated papers to 40 experts in the field of educational sociology, psychology and education. They were mostly the lecturers and senior professors in the Dept. of Education and Psychology in various colleges and universities of Agra. They were requested to report the factors that in their view constituted home environment. Thus, the factors were elicited with their help on common consensus.

(b)   Sample used for selection of Items : After elicitation of factors statements in behavioural forms were constructed for each of these factors and preliminary form of the test was constructed. This preliminary form was administered to a group of 75 High

School students who formed the try-out sample. These students were randomly selected from two High Schools of Agra City which were not included in the sample for final administration of the inventory. This was done with the purpose of selection of Items for the final form of Iventory.

(c) Sample used for collection of Data : This consisted of a total number of six hundred students who were selected to form the main sample of study. Detailed description of this sample is given in the foregoing pages.

STATISTICAL TECHNQUES USED

The following techniques were employed for the analysis and interpretation of data :

I. FACTOR ANALYSIS OF PREFERENCE SCORES OF STUDENTS ON COGNITIVE PREFERENCE STYLES TEST

The study proposed to develop a cognitive preference styles test on Heath's model comprising of four categories viz :
Application, Principle, Critical Questioning and Recall behaviours defined by Heath himself. To validate it, the investigator found out inter-correlation matrices of individual scores on these areas of cognitive preferences and then subjecting these inter-correlation matrices to cluster analysis by principal component method. Thus the researcher obtained factor structure of cognitive preference styles on the test which she herself developed.

II. CORRELATIONS

Correlations are computed to investigate the degree of simultaneous or concomitant variation of two variables. In the present study such concomitancy between the variables: age, achievement, home environment, social class and their cognitive preference styles has been studied. In these cases product moment correlation has been computed.

III. ANALYSIS OF VARIANCE

The chief method employed for statistical treatment of the data was analysis of variance. The study sought to test certain hypotheses that no difference exists in cognitive preference styles and among the variables of the study.

One convenient and statistically sound method to compare the means of perception scores was to do so through the analysis of variance. The use of analysis of variance assumes normalcy and homogeneity of variance in the population compared. Since the selection of samples from their respective populations was nearly random and unbiased it was justifiable to believe that these conditions are satisfied. Otherwise also, this method is quite competent and has sufficient tolerance for slight departure from normalcy and equality of variance. Which means that violation of these assumptions do not materially affect the inferences. Thus instead of using Barlett's test of homogeneity, a more rigorous region of significance i.e. (0.01 - 0.05) was used for accepting the 't' ratio as significant.

IV. CHOICE OF VARIANCE MODEL

Choice of an appropriate model of analysis of variance is an imporatant factor for accuracy of results of comparison. The purpose of the present study, the nature of variables and nature of processed data suited to the application of mixed model with two way classification. The interest of the investigator was to find out cognitive preference styles of High School girl students. It was not her intention to go beyond it for the purpose of making generalisations, so preference styles variable could be considered as fixed effects (independent variable). Other variables i.e. age, achievement, social class and Home environment as flexibile random effects (dependent variables). Thus the design of analysis of variance contained cognitive preference styles fixed effect in columns and other variables (random effect) in row with only one entry in each cell. This kind of model is called 'Mixed model' and in such a model, the proper error term used as denominator in calculating 'f' ratio is iteraction ($J \times S$). No within group SS is found where n=1 , that is, where there is only one entry in each cell, nor

in testing of row effects made. In some analysis of variance in this study cognitive preference style score were used as treatment in columns with other dependent variables in rows in order to test the hypotheses of no difference of cognitive preference styles with regard to the age, achievement, social class and home environment. For these analyses too, the same mixed model was applied.

COMPARISON OF PAIR OF MEANS

Significant 'F' ratios indicate that there is an overall defference among the samples compared, but it does not tell, how pair of means on which analysis was carried out, compare with each other. Sometimes when even one mean sharply differing from other means may make 'F' ratio significant so that 'F' test, when found significant, followed by 't' test in order to compare different pairs of means for significance of difference.

4

Development of the Test of Cognitive Preferences/Styles

One of the foremost objective of this investigation is to discover the nature of cognitive preferences of high schools students and to establish relationship that exists between modes of cognitive preferences and age, achievement, socio-economic status and home environment of the students. As there was no appropriate and ready made test available, the investigator set herself to construct one such test. This test of cognitive preference style is not an ability test to measure, "whether the student can identify correct or incorrect information, but rather, what he is likely to do with the information intellectually" (Heath, 1964). There are neither standard concepts nor standard scales but the scales used here are the discrete categories modelled in the design of Heath's Cognitive Preference test. Heath devised a cognitive preference test to measure cognitive preferences of high school Physics-students taught under the 'PSSC' curricula. He identified the following four modes of cognitive preferences.

i)   Acceptance of scientific information for its own sake i.e. without consideration of its implication, application or limitation. This mode is designated as Recall (R).

ii) Acceptance of scientific information because it exemplifies or explains some fundamental principles or relationship. This mode is designated as Principle (P).

iii) Critical Questioning of specific information with regards to its completeness, general validity or limitations. This mode is designated as Critical Questioning (Q).

iv) Acceptance of scientific information in view of its usefulness and applicability in general social or scientific context. This mode is referred to as Application (A).

These modes originally proposed and defined by Heath have formed the basis of several cognitive preference tests, which have aimed at establishing cognitive styles in relation to scientific information. The general characteristics of this test is that each item first presents some limited information or data of scientific nature and then offers four extension statements which correspond closely to the four above mentioned areas of cognitive preferences. The child is required to grade these four extension statements according to his preferences giving 'four' marks to the statement which he liked most and 'one' mark to the statement which he liked the least. In between the two extreme points he was required to give 'three' and 'two' marks according to his degree of preference for those statements. Thus the preferences of the students are studied. This is a way of studying functioning of the mental structures of the child.

For the development of the test the researcher followed the following steps :

1. Defining purposes and objectives of the test.
2. Defining objectives in terms of scientific behaviour.
3. Construction of the test items.
4. Development of the preliminary form of the test.
5. Try-out of the preliminary form of the test.
6. Scoring of the test and item analysis.
7. Development of the final form of the test.
8. Administration and scoring of the test.
9. Ascertaining reliability of the test.
10. Ascertaining validity of the test.

I. Defining Purposes and Objectives of the Test

Some of the members of the Centre of Genetic Epistemology like Johak Heere, Mandelbret, Piaget (1958) etc. studied children's readings of experimental situations at various levels of cognitive competence and found that at all levels (Perceptual, Sensorimotor or Conceptual) children do not always record the facts but make inferences from the situations presented to them. These, subjective inferences go beyond the directly observable phenomena and are based on the systems of co-ordinated actions which 'Piaget' believes are at the origin of pre-logical or logical thought. Morf, smudslund (1959) studied the relation between logic and learning and concluded that logic or inferential preference is always associated with learning. It explains the fact that correct information or the fact itself is not important but what is important is the way the fact or correct information is interpreted by the respondent.

The recent researches by Heath and others offered indication of multidimensionality of learner's cognitive functioning and developed cognitive styles on the basis of the modes of cognitivereferences. The four modes of cognitive preferences as identified by Heath are, clusters of behaviour that the respondent displays against a question which includes all possible samples of cognitive preferences.

In conducting the present study the researcher started with the basic assumption that it is not the correct responses which are effective in the development of learning but the satisfying situations in which the learning material is presented and the preference in which an individual attends to the basic learning material. Thus, the researcher was led lead to believe that the objectives of the present study can be successfully accomplished if the hierarchy of Heath's four modes of cognitive preferences are employed to study the cognitive preference styles of high school students.

II. Defining Objectives in Terms of Specific Behaviour

The four modes of cognitive preferences originally proposed by Heath, forms the basis of the present 'Cognitive Preference' test.

A typical example of an item is given below to illustrate the four modes of behaviours of the students.

Item : The purpose of a given mass of a gas is directly proportional to its temperature when volume is kept constant.

1.   The above statement does not clarify how the density of the gas changes with the change in pressure.

2.   The above statement is a gaseous law.

3.   On the basis of the above law or statement, the constant volume-gas thermometer has been made.

4.   According to the above statement, if the pressure of a given mass of gas is P_1 and P_2 corresponding to its temperature T_1 and T_2, then the relationship between pressures and temperatures is given by the expression $P_1/P_2 = T_1/T_2$.

The choices (1) is a preference placed by the child for questioning. Here pupil questions to seek the general validity of exchange of gases, thus this option is discriminated from other three options as the students here prefers the option for its general validity.

The choice (2) is a re-statement of the characteristic feature of wall of air sacs. The child will accept this information only to reproduce the structure of air sacs of lungs. In this way the option is discriminated from other options and is termed as 'Recall'.

The choice (3) is discriminated from other choices for its acceptance for the sake of its utility in scientific context. The behaviour displayed by the child is due to the general utility or applicability of the statement for purification of blood in lungs. Because of this utilitarian view the option (3) is termed as 'Application.'

The option (4) is a generalization of the statement given in the stem. Therefore, the behaviour displayed by the pupils on this option is a preference for generalization and is termed as 'Principle'. Sometimes the students may like this option to seek the relationship between walls of air sacs and blood vessels. He may be interested to prefer this due to the explanation of the principle of exchange of gases. This behaviour displayed by the student undergo to the 'Principle'.

Thus, it is seen that the behaviour displayed by different options are different. The proposition of the researchers is that the pupils react to these choices according to their own mental make up. Some would prefer 'Recall' while others, if they are more analytical in their make-up, will opt for 'Questioning'. In this way the present study is more clean about levels, the hierarchy of cognitive competence. Children make inferences go beyond the directly observable phenomena that are based on the system of co-ordinated actions. It was taken care of by the behaviours of the items of the cognitive preference test developed by the researcher.

III. Construction of Test Items

The investigator constructed altogether 80 items on different topics of Home Science i.e. Physiology, Health and Hygiene, food and nutrition, Home management, first aid and Home nursing : The cognitive preference testing was based on the subject matter content, it was justifiable to select the relevant topics from the course prescribed by the Board of High School and Intermediate Examinations so that the student makes a valid preference. Tamir (1976) asserted that this subject matter dependence is especially relevant when one deals with the relationship between cognitive preferences and achievement both of which relate to subject matter areas. The criteria for selecting the topics was the weightage given to each topic by the syllabus designers and also the frequency counts of the questions asked in the examination papers.

Table 4.01 describes the number of items constructed in different areas of the syllabus of Home Science for High School classes.

Table 4.01

List of items of the test of cognitive preference styles.

Physiology	Health & hygiene	Food and nutrition	Home Management	First aid and Home nursing	Total
30	16	14	08	12	80

The specific contents selected by the researcher in different topics are given above. The investigator selected a total number of eighty items with four options in each of these items. The items were then handed over to the High School teachers of Home Science. The items, approved by them were retained for the preliminary form of the test. Thus, twelve items were deleted. These items were then given to a panel of experts who were specialists both in the subject contents and also in the techniques of test development. They were requested to allocate one of the areas of cognitive preference style to each option of the item. The items which registered the approval of the experts were finally selected for the try-out test in all eight items were removed.

IV. Development of the Preliminary Form of the Test of Cognitive Preference Styles

The preliminary form of the test consisted of sixty items. These were arranged areawise. Each of the item consisted of a stem which was followed by four options. The options were not arranged symmetrically for each of the items but were put in random order on the basis of lottery drawn for each item. It was done to avoid guessing in ranking the items by the students. Table 4.02 indicates the number of items constructed on various parts of the syllabus of Home Science for High School students.

Table 4.02

Items of the preliminary form of the test of cognitive preference styles.

Physio-logy	Health & hygiene	Food and nutrition	Home managment	First aid & Home nursing	Total
24	13	10	03	10	60

V. Try-out of Cognitive Preference Test

With a view to select the items for the final form of the test, the preliminary form of the test was administered to a sample of two hundred High School students offering Home Science as one of their optional subjects. These students were randomly selected from the school population of Agra City.

This preliminary form of the test consisted of sixty items with instructions given overleaf which were followed by an example to illustrate as to what is required from the students. The scheme of the time allocation was simple. It was at the rate of one minute per item. In all sixty minutes for sixty items were given. Since it is not an ability test, the students were instructed to answer each of the items and the time limit was relaxed for those students who attempted it rather slowly. But, most of the students finished the test within the allotted time.

VI. Scoring of the Test

For scoring the items the researcher departed slightly from Heath's procedure where only one (the most preferred option) out of the four options were chosen for each item of the test. The researcher followed the graded rating procedure adopted by Kempa & Dube (1973) for its scoring purpose. The students were instructed to arrange the options within an item in an order of preference by allotting 'four' marks to the most preferred 'three' to the next preferred 'two' to the choice which was allotted third preference and 'one' to the least preferred item. The advantage of this procedure in the words of Kempa & Dube (1973) is that 'all responses appearing in an item contribute to students' overall cognitive preference profile, unlike the normal procedure of re-sponse-selection where rejected options were treated as equally unattractive." The scoring was done with the help of scoring key.

VII. Item Analysis

For selecting the items for the final form, the items were analysed by calculating the preference indices values for each response option using the following formula which was adopted by Kempa & Dube in their study (1973).

$$\text{Preference Index} = \frac{\text{Score on a particular response}}{\text{Scores for all responses in one item.}}$$

The preference Indices calculated on these lines are given Table 4.03.

Table 4.03

Preference indices for 35 items of the test of cognitive preferences styles.

Item No.	Preference Index	Item No.	Preference Index
1.	0.254	19	0.299
2.	0.263	20	0.289
3.	0.200	21	0.279
4.	0.255	22	0.289
5.	0.246	23	0.256
6.	0.259	24	0.259
7.	0.269	25	0.269
8.	0.298	26	0.278
9.	0.299	27	0.288
10.	0.288	28	0.299
11.	0.208	29	0.287
12.	0.207	30	0.285
13.	0.243	31	0.284
14.	0.245	32	0.273
15.	0.246	33	0.233
16.	0.249	34	0.243
17.	0.289	35	0.256
18.	0.279		

All these items having preference index between 0.20 and 0.299 were selected for the final form of the test. Items having preference index above this range were excluded with the assumption that they were biased. This removed 25 items and thus 35 items were selected for the final form of the test.

Justification of the Statistics Used

The Statistics behind this criterion for selecting the items is interval estimate of the proportion. Since, the syllabus is meant for students of heterogeneous abilities, the probability of each option of the item to be selected is equal. Thereby, it is assumed that a proportion, $P = 1/4$ or 0.25 with regard to the total weightage should be obtained for each one of the areas of cognitive preferences. As such, the fiduciary limits of interval estimates (significant at 0.01 level for No. = 600 is P = 0.25) of the proportion, P= 0.25 for a sample size (No. 200) will be calculated by the formula :

$$\text{Upper limits} = P\ 1/2\ N\ \pm 2.58\ \frac{P(1\text{-}P)}{N}\ \text{at } 0.01 \text{ level.}$$

$$\text{Lower limits} = P + 1/2N\ \pm 1.96\ \frac{P(1\text{-}P)}{N}\ \text{at } 0.05 \text{ level.}$$

The values thus, calculated for the upper and the lower limits were found to be 0.299 and 0.20 respectively. Thus, the interval estimate of the proportion 0.25 should lie within the range of 0.299 and 0.20.

VIII. Development of the Final Form of the Test

Finally, 35 items were selected. These items were then organized in a test form, compiled into a test booklet with instructions overleaf for answering the questions. The arrangement of items was random without respecting for the items to be knitted into the topic selected. The test items being preference items, no consideration for the difficulty level of the items was registered in arranging the items into final test form.

IX Administration and Scoring of the Test

The final test along with the separate answer sheets was administered to a sample of six hundred high school students offering Home Science as one of their optional subjects. The

instructions printed overleaf were supplemented with the oral instructions by the test administrator to facilitate clarity and understanding of the subject with regard to test performance and its objective. They were told that this was not an examination. They were free to report their preferences on separate answer sheets provided to them. No tension of any sort should lead them in their response. But, they were asked to see that they had responded all the items of the test.

IX. Reliability of the Test

There are several methods of estabilishing reliability of a cognitive preference styles test. They include parallel form method, test-retest method, split-half method or ascertaining internal consistency. The researcher is not interested in seeking whether the two forms of the test are stable or equivalent, therefore, it was not justifiably admitted to establish the reliability of this test by test-retest or by split-half method. Further, because of certain limitations imposed upon the computation of split-half reliability that is with regard to the split. This methods was not employed by the researcher. The only saving device used in this regard was, to ascertain internal consistency of test items. The measure of internal consistency generally adopted by the researchers are formulae 20 and 21 of Kunder Richardson. But with present context an Index Alpha Cronbach was used.

Table 4.04

Alpha Cronbach Coefficients of four areas of Cognitive preferences in home science.

| No. of Itmes | Area of Cognitive Preferences Style | | | |
	'A'	'P'	`Q'	'R'
35	0.34	0.60	0.70	0.70

Figures of the Table 4.04 indicate that the internal consistency coefficients of cognitive preference area 'Application' is low in comparison to other areas of cognitive preferences. It indicates that items of application area are not discriminated well, these could not receive attraction of the students, the reasons as we can guess may be that, they are not useful from the point of view of the examination.

Though the reliability of the application area of the test is low still the test can not be said to be unreliable. Comparison of the reliability coefficient reported by other researchers who worked in this field proves the reliability of the present tool. Table 4.05 shows the reliability coefficient scores of other researchers who worked in this field.

Table 4.05

Internal consistency coefficients for four areas.

Disci-pline	Level	'N'	No. of Items	'R'	'P'	'Q'	'A'	Year	Authors
Science	8th	445	10	0.42	0.27	0.23	0.13	1975	Brown
Biology	10th	390	20	0.76	0.74	0.55	0.55	1976	
Physics	10th	407	20	0.76	0.72	0.62	0.75	1976	P Tamir
Chemistry	12th	499	20	0.66	0.64	0.58	0.67	1976	
Biology	12th	989	40	0.82	0.80	0.84	0.73	1975	P. Tamir

XI Validity of the Cognitive Preference Style Test

No reference has yet been made of any validity index of cognitive preference test. Construct validity can only be ascertained for this test. The views expressed by Dressel & Mayhew (1954) may be considered and taken for granted to ascertain validity of the present test. They said that, "The appropriate method to ascertain validity of the test must rest on the cumulative significance of a large number of both positive findings and on the steps taken in writing the tests in the first place."

Since the steps in writing the items of cognitive preference test were in agreement with the opinion of the experts who were considered to be experts in this field, hence it can safely be stated that the items of this test measure the preferences of the students in four areas of cognitive preferences as advocated by Heath. The confirmation of several research hypotheses regarding the test and partial confirmation of the constructs by factor analysis contribute evidence concerning the validity of the present test.

5

Presentation, Analysis and Interpretation of Data

SECTION 'A' : STUDY OF COGNITIVE PREFERENCE STYLES OF HIGH SCHOOL GIRLS IN RELATION TO THEIR AGE.

The present study is intended to investigate the cognitive preferences of girls as they vary from age 13+ to 18+. A large number of studies on modes of cognitive preferences of students have been conducted in different countries in the recent years. The most popular are by Heath (1964); Kempa (1973); Tamir (1975, 1976 & 1977) and Marks (1967); Atwood (1969); Watkins & Hobbs (1977). THe selected variables were age, sex, achievement, the major field of study, career expectations etc. Individual differences with regard to variables were identified in all these studies. Age was considered one of the most important factors which was proposed to cause variations in cognitive styles. The researcher also considered it to be an important factor and studied, if the variations in age is a real and significant component to change the cognitive preference styles. Different studies have reported varied results. The reasons being the studies were not conducted on similar samples. This fascinated the researcher also and she designed her study on a sample of adolescents only.

The data with regard to the study of variations in age comprised the first preference frequency counts on each of the four cognitive modes. For the present study a null hypothesis that "the preference mode of the subjects (counting first preference

only) is independent of the age of the subject, was set up. The study was not conducted on the total sample of 600 students but around the sample of half of it (300 students) was included to accomplish this objective. It was done simply by selecting every third of the girls in the sample.

A contingency table was then drawn to test the independence of the variables, assigning first preference frequency counts on A, P, Q, R modes along the 'X' Axis and age counts of the subjects along the 'Y' Axis. Table 5.01 gives details of this analysis:

Table 5.01

Contingency table showing Chi square test of independence between the age cognitive modes of preference.

AGE	'A'	'P'	'Q'	'R'	TOTAL
13+	339	341	340	345	1365
14+	346	340	331	335	1352
15+	336	351	334	334	1355
16+	348	348	351	368	1415
17+	341	358	434	435	1568
18+	356	332	461	469	1618
	2066	2070	2251	2286	8673

Sample of subjects	-	300
No. of preference styles or modes.	-	4
No. of age groups	-	6
Chi-square	-	17.62
Degrees of freedom	-	15

The value of chi-square required for being significant at 0.01 level is 30.58 for 15 degree of freedom. The obtained value of chi-square in the present case is 17.62 which is much less than the required value. We therefore, have all the reasons for accepting the hypothesis of independence between the modes of cognitive

preference and age. The inference that seems to be the natural outcome of this analysis is that there is no association between the first preference place for 'A', 'P', 'Q', 'R' and the growth in age of the girls. That is the preference style of the subjects do not change with the advancing age of the girls. This study relates to the most liked attributes in which the second, third or fourth preferences were ignored. To consider all these preferences, the scores with regard to each one of the preferences for each one of the modes were calculated and 'F' test was applied. The computerised data is given in Table 5.02.

Table 5.02

Showing two ways analysis of variance for age and styles, 'F' values and interaction.

Source of variance	Sum of square	Degree of freedom	Mean square	'F' ratio	Remark
Age	0.000	5.0	0.000	0.000	Insignificant
Styles	7.000	3.0	2.333	0.230	"
Age Styles interaction effect.	41.000	15.0	2.733	0.270	"

The results of analysis of variance study disclose that the null hypotheses set up in this regard are not tenable both with regard to variables of age and cognitive styles. The six age groups as such from 13+ to 18+ do not account for the variations between the individuals on the performance of the cognitive style test or changes in cognitive style do not occur with the advancement of the age of the individuals. In the same way, the cognitive styles i.e. 'Application', 'Principle', 'Critical Questioning' and 'Recall' are independent of the behaviour of individuals on test performances. Although, in other studies like those of Williams (1976) and Atwood (1968) changes were found to occur across the age on at least 'Recall' mode of the cognitive styles. Thus, the present findings stand contradicted to those of Williams & Atwood.

The two variables i.e. age and styles were supposed to account for the variations within the individuals, that is, the cognitive styles may cause variations or the variations occur naturally with the advancement of the age. The statistical analysis having accepted the null hypothesis in this regard finds none of the two variables as significant to account for the variations.

This can be inferred that cognitive styles in Home Science are not the expressions of cognitive abilities of students. These conclusions can be conformed by the inferences drawn in a study, 'Educational implications of Cognitive Styles' by Witkins et al. (1980). Cognitive styles are pervasive dimensions. They cut across the boundaries and are believed to be inappropriately used in compartmentalising the human 'Psyche' and so help restore the "Psyche' to its proper status as a holistic entity. This characteristic has important implications for the educational settings reflecting their pervasiveness. Cognitive styles carry a message about what we traditionally call, 'Personality, so, it is a feature of personality and not of cognition' (Witkins, 1980). The cognitive styles rather seem to represent a different type of objective, which may be evinced by what the students typically 'does do'. These may be attitudes interests, cognitive modes of thinking types of objectives etc.

Most of the studies with regard to the change in cognitive styles with age have been conducted in science subjects as general science, physics, chemistry and biology etc. The nature of these subjects somehow resemble the nature of the subject Home Science. So, the implications of age group was supposed to bear similar effects on the cognitive styles in the subject Home Science also but some of these findings corroborate while others contradict the present findings.

In a similar study, conducted by Dr. R. Chandra (1983) on the subjects physics and chemistry, the 'F' values were found significant on 'Principal-Questioning' modes of cognitive preferences. He takes cognitive preferences of Heath as cognitive styles in chemistry and in 'Application-Recall' in Physics. These changes are found significant across the age as the children go beyond the age from 14+ to 17+ and on rest of the modes the preferences were found stable. Thus, these findings partially contradicted the present thesis of no difference in cognitive styles across the age. Just possible the partial differences occur

because of the differences in the nature of subjects, themselves. Even otherwise, these factors need to be further probed.

The changes were found to occur in another similar study conducted by Williams & Atwood also. But, these changes identified were in the nature of fluctuations. Sometimes enhance and sometimes showing a downward trend. But, no change was observed across the age on cognitive modes or styles invariably.

The results of the analysis of variance study are conclusive in the sense that the variation in cognitive styles of students are independent of varying differences of age of these students as also of modes of preferences. There is no impact of age in variations of cognitive styles of students. For these variations, the reasons should be sought elsewhere. The subjects recorded their preferences from I to IV on cognitive styles test. This was an ordered display of preferences. The other way could have been to record first preference and to place other preferences as equals. Yet, another way could have been to select only two equally good preferences and the like. So, there could have been a number of alternatives for the assessment of preference study. Here the researcher's purpose was not to rank order the cognitive modes but to study, if this method of placement of 1st, 2nd, 3rd and 4th preferences could somehow be instrumental in justifying the differences of cognitive styles within the students. A two way analysis of variance was applied to study the differences of means scores between the preferences and age, which appears in Table 5.03.

Table 5.03

Showing two way analysis of variance for preferences and age, 'F' values and interaction.

Source of variance	Sum of square	Degree of freedom	Mean square	`F' ratio	Remark
Preferences	2.000	3.00	0.666	0.066	Insignificant
Age	0.000	5.00	0.000	0.000	"
Age preferences interaction effect	5.000	15.00	0.333	0.033	"

The results of the study of analysis of variance disclose that there is no overall significant difference in the means of cognitive preference scores recorded by the subject sample. Again, the two way analysis carried over the second variable, the age-means also exhibit no significant difference like the means of preference scores but the level of acceptance of null hypotheses is 0.01. As none of the 'F' value is found significant, there was no justification in testing the mean scores of differences on individual items. The null hypotheses with regard to both the age and preference is found accepted at the 0.01 level. The marking of preferences : 1st, 2nd, 3rd and 4th is independent cognitive function of age. It seems natural also because the characteristics of adolescents are common and are supposed not to vary within the adolescent period. The null hypothesis with regard to interaction between the variables is also accepted. The interaction of age on preference is in the proximity of 'zero'. It can be interpreted that age has no effect on preferences of the subjects. The study was further extended to find out, if preferences counted up on the cognitive styles of the students. A two way analysis of variance study was done with regard to these variable also. The computerised data is presented through Table 5.04.

Table 5.04

Showing two way analysis of variance for styles and preference 'F' value and interaction.

Source of variance	Sum of square	Degree of freedom	Mean square	`F' ratio	Remark
Styles	7.000	3.0	2.333	0.230	Insignificant
Preference	2.000	3.0	0.666	0.066	
International effects styles & preferences.	12860.000	9.0	1428.889	41.252	Significant at 0.01 level.

The observations of Table 5.04 are revealing. They add a dimension of effective interaction of preferences on styles. The 'F' values computerised for the differences between cognitive styles, the Application, Principle, Critical Questioning and Recall as also between preferences or the marking of 1st, 2nd, 3rd and 4th choices on the cognitive test forms are found insignificant at 0.01 and 0.05 levels. But the interactional analysis index (141.252) extoles significant effect of preferences on the styles. What has been realised by the analysis is but natural. Significantly enough it explains that marking of preferences (1st, 2nd, 3rd & 4th) does have a significant impact upon the qualitative assessment of cognitive styles.

The findings of the Table 5.04 can be developed into the following thesis :

1.   The cognitive preferences of the individuals are stable as no significant differences across the age are identified from the analysis of the data gathered on this study.

2.   Individuals also do not differ in styles across the age. It is a corollary of the thesis given above. When individuals do not differ on modes of preferences across the age, their cognitive styles will also remain immutable during the whole period of adolescence.

SECTION 'B' : A STUDY OF COGNITIVE STYLES OF HIGH SCHOOL GIRLS IN RELATION TO ACHIEVEMENT IN HOME SCIENCE

The purpose of present investigation was to study, if achievement of the students in 'Home Science' is related to the cognitive styles of students. Though none of the study was found for reference in the subject, "achievement of students in Home Science and its relationship with cognitive styles." Yet, number of studies are available which supply an index of correlation between achievement of the students in science with the students'

cognitive styles. Pinchas Tamir & Kempa (1978) found only a weak correlation between achievement and cognitive preferences of students. Witkinson (1976) suggested that the cognitive styles were significantly related to the continuing academic achievements of students. Tamir (1977) obtained indices of correlations of varying degrees between the test score in biology and students cognitive styles. The test of biology was assessed in terms of cognitive abilities namely knowledge, comprehension and higher abilities. The findings of the study indicate that there exists no correlation between cognitive preferences and level of cognitive operations.

The studies quoted above advance a fact that subjects differing in cognitive styles have repeatedly been found to differ in their task performances. The researcher was under a fix, if the findings of science subject (Physics, Chemistry or Biology) could however, be implemented in the teaching and evaluation of Home Science to girls also. She, in a mood to get relieved of the fix attempted this part of the study with the objective, "To study the extent to which cognitive styles in Home Science are related to the achievement of girls in Home Science." To accomplish this, the researcher developed a standardized achievement test in Home Science. It was administered and scored for the subjects sample defined in chapter third. These scores were then manipulated with regard to the four cognitive preference styles i.e. 'Application', 'Principle', 'Questioning' and 'Recall' to find their relationship with the achievement scores of girls in Home Science. The achievement scores in Home Science were then divided into three categories i.e. high achievers, average achievers and low achievers. to do this, a simple statistics was used to identify these categories. A frequency distribution of achievement scores was first made then the students beyond 75th percentile were taken as the high achievers, and those below 25th percentile were taken to be the low achievers. While the rest were identified as average achievers. To see, if there were no significant differences between the three successive categories of achievement separately with the four discrete categories of cognitive styles, chi-square test of independence was employed. The findings appear in Table 5.05.

Table 5.05

Showing mean scores for cognitive styles tested for
significance with regard to the achievement levels of students.

Area of Cog. Styles		High achie- vers	Average achiev- vers	Low achiev- vers		SEDM diffe- rences of mean	't' values obtained for the mean diffe rences between :		
							1 & 2	1 & 3	2 & 3
'A'	Mean	81.50	83.7	84.67	1	1.14			
					2	1.27	1.94	2.49	1.01
	S.D.	8.35	6.89	6.44	3	0.95			
'P'	Mean	85.00	85.43	86.03	1	1.125			
					2	1.38	0.38	0.74	0.50
	. S.D.	7.82	7.89	8.28	3	1.18			
'Q'	Mean	105.92	79.11	76.11	1	1.74			
					2	1.87	15.40	15.94	2.22
	S.D.	12.80	10.61	8.74	3	1.35			
'R'	Mean	78.85	83.71	89.24	1	1.85			
					2	2.15	2.62	4.83	3.27
	S.D.	13.40	11.74	11.85	3	1.69			

Table 5.05 illustrates significant difference between the pair
of two successive groups that is between high/average; high/low
and average/low consistently i.e. the differences are negative that
is the Recall mode is of supreme preference for low achievers and
is of middle preference for the average and that of least preference
for high achievers. It exemplifies the fact that with increasing
achievements of the girls, the preference of 'Recall' mode de-
creases. These findings are significant in the sense that 'Recall'.
mode which is most emphasized during teaching plays a negative
role in the achievement of high school girls in the subject of Home
Science. Evidently, these inferences are drawn from the signifi-
cant differences obtained between high and average, high and low,
and average and low achievers on 'Recall' mode.

Girls in general express preference for 'Questioning mode
of cognitive functioning in its approach to problem solving, a
subject matter sophistication and a general level of higher
intelligence. It also explains the specific academic aptitude

motivation for learning, intellectual curiosity and self critical ability, which may perhaps be accounted for the higher achievement of girls who fancy 'Q' mode. Significant differences are identified on 'Q' mode also between high and average, high and low and average and low achiever girls. It signifies the fact that 'Q' mode being symbolic of higher mental functioning of the girls is instrumental in the girls higher achievement in Home Science.

People in general accuse the examination system for being too much 'Recall Oriented' but the findings in this regard are revealing in a way that 'R' mode is a fancy of low achievers and those who place higher preferences for 'R' mode of cognitive styles test in Home Science come from comparatively lower achievement groups of subjects. It would not be out of place to comment that the people accuse 'Essay type' examination which may necessarily cause poorer scores of students in the examina-tions but in the present case, the achievement test developed to measure achievement in Home Science is an 'Objective type' test whose reliability and validity indexes stand tested. So, 'Critical Questioning' a higher mode of mental functioning designs the higher achievement of girls rather than the 'Recall' mode. The significant 't' values computed among the three levels of achievement justifiably explain the phenomenon of genuine association between girls academic achievements and 'Question-ing' styles of choices. The high being associated with high and low with low impairs a judicious conclusion that achievement in Home Science is a function of girls 'Questioning' style of operation.

The inference that is a natural outcome of the present interpretation is that it is a 'Questioning' mode rather than the 'Recall' mode that, however, can determine the higher achievement of girls in Home Science. The higher 'Questioning' mode, therefore, seems to be a direct function of the achievement of girls. The differences realized on 'Q' mode of cognitive styles between the high — average, high — low and average — low. It is true in another sense also that the achievement in Home Science is a function of individuals' higher mental capacities which is repre-sented by 'Q' mode rather than the 'R' mode of subjects prefer-ences. Therefore, the study of achievement and preference relationship reveals the supremacy of cognitive functions in the choice-making process of the girls. No significant difference on 'P' mode of choice making appears which signifies the acceptance of

scientific information for its own sake i.e. without considering its implications, applications or limitations as also with a view to its usefulness and applicability in general, social and scientific concept. Of course, a trend of lowering on application mode is also rendered in the above analysis but this trend can not be summarised as significant. Statistically too, no significant differences between any two successive groups of girls on academic achievement, even with regard to 'Application' mode are found yet. The trend being substantial does only explain the significant differences between the high and low achievers of students. Although the differences are significant between successive groups of girls on levels of achievement. The low achievers only are found to display higher mode for 'A' the utility orientations the difference being negative, the 'A' mode can not be acclaimed as a positive factor for the achievement of students. The 'A' mode is unrelated to the achievement of students in Home Science. Any how, to study further, the four modes of cognitive styles were separately correlated with the achievement of girls. The correlation indices, so obtained are displayed through Table 5.06.

Table 5.06

Showing coefficient of correlation obtained between achievement of girl students in Home Science and their cognitive preference styles.

Sl No.	Variables	Coefficient of correlation	S.E.	't' Ratio	Significant
1.	Achievement & Application	0.87	0.058	1.50	Insignificant even at 0.0
2.	Achievement & Principle.	0.004	0.058	0.07	"
3.	Achievement & Questioning.	0.404	0.058	6.96	Significant.
4.	Achievement & Recall.	-0.289	0.058	4.98	"

The study of findings of mean scores differences tested for significance is supported by the findings of the above correlation table. Insignificant 't' values in the vicinity of non-cognizance obtained between achievement of girls in Home Science and their 'A' and 'P' modes of cognitive styles. It can be explained that the 'A' and 'P' modes of cognitive styles are in no way related to the achievement of girls in Home Science. While significant correlation indices are obtained between achievement of girls in Home Science and their 'R' and 'Q' modes of preferences.

These findings extole that the achievement of girls in Home Science are determined by the 'Q' and 'R' modes of cognitive styles. But for 'Q' mode high 'Q' goes with High achievement, while the reverse is true for 'R' mode. It can be recalled here that Heath in his studies claimed that the studies on cognitive preference mode do provide a more effective characterization of men and women than could be obtained from the mental tests alone. These claims do encourage a teacher to seek prospects of predicting achievements in Home Science through the study of the cognitive styles of girls. Pinchas Tamir (1966) found that the high achievers exhibit a strong preference for 'Critical Questioning' and weak one for 'Fundamental Principle' and 'Application' and strong dissatisfaction with 'Recall' mode. These findings of Tamir are fully corroborated by the findings of the researcher's study. A strong dissatisfaction is shown between 'R' mode and achievement through this study also. The researcher's low achievers also display a favour for 'Recall' mode of cognitive preferences in Home Science. It means that to Pinchas Tamir 'Recall' mode of preference is not determinant of the high achievement of the same is true for present study conducted on girls.

From the findings given above the researcher is led to conclude that cognitive styles of girls are partial determinants of the achievements of girls in Home Science. While 'Questioning' and 'Recall' modes determine it, 'Application' and 'Principle' modes do not.

SECTION 'C' : A STUDY OF COGNITIVE STYLES OF HIGH SCHOOL GIRLS IN HOME SCIENCE IN RELATION TO THEIR SOCIAL CLASSES

The immediate purpose of present study was to ascertain the nature and intensity of relationship that exists between social

class and cognitive styles of the students. No such study in any of the journal could be found that seeks relationship between social classes of the subject and cognitive styles of students. A single study worth naming is that of Ram Chandra (1983). It seeks relationship between cognitive styles and social class of the subjects. But no index of whatever the nature, was available to describe such relationship between the social class of the subjects and their cognitive styles. Even otherwise, social class was one of the factors that has widely affected the need achievement, achievement, intelligence and other cognitive factors. The researcher did not want to live in wilderness of ignorance and attempted an investigation into the relationship of cognitive styles and the social classes of the girls.

For ascertaining the correlation between social class and the cognitive preference styles of the girls, the researcher developed her own tests and standardized these tests as well. The full text of development of the tests appear in chapter III & IV. The social class scale was also administered along with the cognitive style test to the same sample of subjects. The scores thus obtained were analysed. Dr. Ram Chandra conducted his study in three different subjects i.e. Physics, Chemistry and General Science. His approach was based on the cluster analysis of components. The use of cluster analysis in this project to describe as to what extent certain measures are different from each other is based on the assumption that cluster analysis, "tells us in fact, what test or measures belong together which one virtually measures the same thing and how much they do" (Kerlinger, 1973). Ram Chandra states that he followed this method on a rationale that factor analysis could be employed with facility for the present purpose. Williams (1975) and Tamir (1978) employed a simpler method of factor analysis. Williams in a separate study investigated the relationship between the cognitive preferences and aptitude of subjects in different disciplines. He employed correlational techniques for seeking relationship between the variables.

The researcher has followed Williams (1975) taking that correlational technique also serves the purpose for which Dr. Chandra (1983) adopted a complex procedure.

The present analysis is also a correlational statistic (a product moment coefficient of correlations) obtained between the

four modes of Heath's cognitive styles on one hand and one composite score that belongs to social class on the other hand. Table 5.07. illustrates the relationship.

Table 5.07

Showing coefficient of correlations between the four modes of cognitive preferences styles and social class of the students.

Sl No.	Cognitive preference styles	Coefficient of correla-tion	S.E.	't' value	Level of significance
1.	Application	0.165	0.058	2.84	0.01
2.	Principle	0.129	0.058	2.22	0.05
3.	Questioning	0.354	0.058	6.10	0.01
4.	Recall	0.222	0.058	3.82	0.01

Table 5.07 reveals four different measures of correlation indices for four defined cognitive styles: Application, Principle, Questioning and Recall modes of cognitive styles. All the correlation indices are positive, but seem to be low, signify that the two variables social class of the subjects and the cognitive preference styles go together but the bond is weak.

When these correlations are converted into fishers 'Z' and further tested for significance for a sample of 600 subjects even the low correlations distinguish their worth and are found to be highly significant. The researcher then has all the means to justify that these low positive correlations but significant are meaningful also and can conclude that subjects drawn from higher social class groups tend to show high degree favour for all four modes. If the bigger amount of correlation reflects higher affinity as compared to lower amount of correlations. But Table 5.07 displays higher affinity between social class of the subject with their critical Questioning and Recall modes, Further, if these modes are taken symbolic of the mental functions of the sample. The social class relationship justifies the hierarchy of modes of styles as well.

The correlation is least for the 'Principle' mode and highest for the 'Questioning' mode. If social class index is taken as an index of intellectual capacity because of high significant relationship

always obtained between these two variables by those who con-
ducted their studies in these fields. Then the four   modes of
cognitive styles can also be arranged into a hierarchy of the
modes, on the basis of intensity of correlation obtained in the
present study. These correlational indices are re-organized and
displayed through Table 5.08.

· Table 5.08

Coefficient of correlation between cognitive preference styles
and social class of students arranged in hierarchical order.

Sl No	Cognitive Styles	Coefficient of correlation	Preference level
1.	Questioning	0.354	I
2.	Recall	0.222	II
3.	Application	0.165	III
4.	· Principle	0.129	IV

'Questioning' is the first in the hierarchy of cognitive thinking
while 'Principle' the last. 'Recall' is higher in the plane of thinking
than 'Application'. Behaviourally also 'Questioning' means testing
of information with regard to completeness, general validity or limi-
tations. This is the higher mode of thinking while acceptance of
information just on the basis of example is 'Principle' which is
lowest in the level of cognitive thinking. Likewise,' Application', as
an acceptance of information with regard to its usefulness only
seems to be a lower mental function than 'Recall' the acceptance
of information for its application and limitations. The researcher is,
therefore, led to conclude from the findings of this study that
cognitive modes are nothing but cognitive styles related to the
intellectual capacities of the children.

SECTION 'D': A STUDY OF COGNITIVE STYLES
OF HIGH SCHOOL GIRLS IN HOME SCIENCE IN
RELATION TO PREFERENCE AND ABILITY
MODES

To   study the above interrelationships, the   following
interrelation matrix was computed which gave the following results :

Table 5.09

Showing the intercorrelations of scores on four dimensions of cognitive styles in Home Science.

Sl No.	Cognitive preference area		`A`	`B`	`C`	`R`
1.	Application	(A)	1			
2.	Principles	(P)	-0.520	1		
3.	Questioning	(Q)	-0.060	-0.460	1	
4.	Recall	(R)	-0.273	-0.352	-0.648	1

A study of the above intercorrelation matrix reveals that negative high correlations exists between 'Questioning' and 'Recall' scores. This correlation seems to be slightly influenced by 'Principles' scores. On the other hand a high negative correlation between 'Application' and 'Principles' scores exist which also seems to be influenced by 'Questioning' and 'Recall' scores. Further, the negative correlation between 'A' and 'P' scores does not reach the level of the correlation value between 'Q' and 'R' scores. The remaining correlations being comparatively weak, do not suggest cross influence to exist between these modes.

The relationships suggested by intercorrelation matrix were then subjected to factor analysis (by principal component method) with unities in the diagonal. The factors thus extracted by the principal component method were then rotated (by varimax rotation) to simple structure. Thus this analysis produced two rotated factors which together accounted for 77.50 per cent of the total variance. Table 5.10 shows the factor loadings on the four areas of cognitive styles.

Table 5.10

Showing the rotated factor matrix on cognitive styles scores in Home Science.

Sl. No.	Cognitive Preference Areas		ROTATED FACTORS	
			(I)	(II)
1.	Application	(A)	-0.084	-0.814
2.	Principles	(P)	-0.04	+0.902
3.	Questioning	(Q)	+0.868	-0.266
4.	Recall	(R)	-0.938	-0.286
Percentage of variance			42.50	38.00

From the readings of Table 5.10 it is obvious that factor one has high inverse relationship to exist between 'Q' and 'R' modes as these preference modes show the high loadings on this factor, high positive with 'Q' and high negative with 'R'. Further, the loadings of 'P' and 'A' scores on this factor being very low, can be considered as negligible. Factor two has high loadings on 'P' and 'A' modes but negative high loadings on 'A' and positive high on 'P' mode. An inverse relationship exists between these two modes of cognitive styles. The loadings with regard to the modes 'Q' and 'R' being very low can be considered as ineffective in delineating the label of the factor two. Hence the two modes 'Q' and 'R' have not been considered.

It follows from this, that cognitive styles are predominantly oriented along two independent bipolar axes labelled as :

i)   Critical Questioning   Recall

ii)   Fundamental Principle   Application ·

Therefore, it is appropriate to express them by two instead of the original four measures. Each of these would indicate a student's position on the two bipolar scales. The findings of this study too is analogous with the other previous findings. Hence, the researcher like previous studies (Kempa & Dube, 1978 and R. Chandra, 1983) may label 'Recall'.... Critical Questioning' scale as 'Scientific Curiosity' scale while 'Application Fundamental Principles' scale as 'Scientific Utility' scale. Like previous findings the potential values of these scales remain open for further studies.

Heath (1964) designed four cognitive preference modes and claimed that it provides a more complete and effective characterisation. Heath's exposition of cognitive style as preference was very much appreciated by his followers. But Gardner claimed that distinction between cognitive style as preference and cognitive style as ability was artificial. Considered from this vision, Heath's four independent and disciete preference modes have been computerised along two independent bipolar axes: the scientific curiosity and the scientific utility. Such findings highlight the fact that curiosity and utility factors are but field dependence factor. The curiosity reliance depends upon the social stimuli 'the utility' for their guidance. This leads the researcher to conclude that the styles preferences or 'Intellectual abilities are both the aspects of

total personality and are intimately interwoven with effective temperamental and motivational structures.

The other way also, the factors evolved in the present study are but the two factors of cognitive styles : the analytical and global. Factor scientific curiosity involves critical questioning of specific information. It implies that the individual spontaneously supplies to a particular degree of analysis. The factor curiosity is therefore, analogous to analytic style while the other utility factor can be identified with 'Global' style. Here the individual typically appears global in his approach and extracts utility from the social situations.

These discussions are made to conform Gardener's claim that the distinction between preferences mode or ability style is artificial. The proposition that cognitive findings are comparatively stable overtime and are largely independent of the nature of the information presented to the learner. The first part of the proposition that styles are stable over age range was established through the findings of this study where the researcher found the 'F' ratio insignificant for quite a long age range from 13+ to 18+.

To the second proposition that the styles are independent of the nature of discipline taught, the researcher conducted a comprehensive study of styles in Home Science only. For establishing the second part of the proposition the researcher seeks help from Dr. Ram Chandra's study's findings. Table 5.11 provides illustration to support the above proposition.

Table 5.11

Showing factors of the cognitive styles.

Factors	Present study of Home Science Variance accounted For		Dr. Ram Chandra's Study			
			Physics Variance Accounted For		Chemistry Variance Accounted For	
1.	Curiosity	42.50	Curiosity	37.50	Curiosity	40.50
2.	Utility	38.88	Utility	32.75	Utility	38.75
			Technology	29.25		

Almost the same factors evolve in the analysis of cognitive preferences tests in Home Science, Physics and Chemistry with one exception of Physics where Technology and additional factor appeared in patterning the cognitive styles. The variances accounted for these are also not very much differentiated on numerical counts. The researcher then has all reasons to conclude that cognitive functioning is independent of the information taught. But an additional factor that evolve in Dr. Ram Chandra's study lays a premium on the thesis of independence of cognitive functioning with regard to discipline (the information taught).

In view of the above observations, the researcher may conclude that irrespective of the certain tendencies which appear to cut across three disciplines (Physics, Chemistry and Home Science) the cognitive styles are to some extent subject matter or discipline dependent.

SECTION 'E': THE STUDY OF COGNITIVE STYLES SCALES OF HIGH SCHOOL GIRLS IN RELATION OF THEIR ACHIEVEMENT IN HOME SCIENCE

Atwood criticised the achievement test as limited, wherein, only one valid preference is made on a small topic or content area. Achievement on a test is a non-cognizable phenomenon of learning. It is rather an intangible corollary. In recent years the attention is being paid on the multi-dimensionality of cognitive functioning. Learning in fact, is a function of the way the contents of learning are attended to. It is thus a process approach which · counts for learning and thereby achievement of students. Cognitive preference tests claim to provide a total picture of functioning of individual's mind. Subsequently, Heath also claimed that studies in cognitive preference modes would provide a more complete and effective characterization of men and women than could be obtained from achievement or mental tests alone. This claim initiated the researcher to seek prospects of predicting achievements in Home Science through the study of cognitive preference of women. Pinchas Tamir in his study (1976) found that high achiever exhibits a strong preference for critical Questioning and a weak one for fundamental principle and a strong dissatisfaction with 'Recall' mode in Science. Further, the high achievers tend

to exhibit high loading with $(Q \rightarrow R)$ the scientific curiosity mode, while the low achievers exhibit high loading with $(A \rightarrow P)$, the utility mode and lack of scientific curiosity. These findings appeared to be of much help. A set of cognitive style test was developed on Heath's model in Home Science and administered to a sample of 600 girls of Home Science reading in High School classes. It was then scored according to the scheme of scoring scheme and scores thus, obtained, were manipulated separately for high (n = 138), average (n = 338) and low (n = 134) achievers in Home Science. Then the four styles were coalesced by collapsing individuals. An intercorrelation matrix was then derived which was further subjected to principle component factor analysis and varimax rotation. Bipolarity within modes was identified. The factor matrix with positive and negative loadings is presented in Table 5.12.

Table 5.12

Showing clusters of styles for the three groups :
High, Average and Low achievers.

Sl No.	Factor Identified	High Achievers		Average Achievers		Low Achievers	
1.	Scientific curiosity	$Q \rightarrow R$ +	- 	$Q \rightarrow R$ +	- 	- 	-
2.	Utility	- 	- 	$A \rightarrow P$ +	- 	$A \rightarrow P$ +	-
3.	Memory	- 	- 	- 	- 	$R \rightarrow Q$ +	-
4.	Scientific Rule	$P \rightarrow A$ +	- 	- 	- 	- 	-
5.	Technology	$A \rightarrow R$ +	- 				

The profile observation of Table 5.12 seems to conform the findings of Pinchas Tamir (1976) partially. The researcher, instead of selecting the high and low achievers only for comparison,

picked up the three groups of high, average and low from the total range of the subjects sample. In a way, it just seemed to be a replication of Tamir's (976) findings. Even the readings or amount of loading and variance accounted for, show a slight variation which may be due to cultural difference or in a little change of the design of the study.

Even the findings of this study exhibit strong choice for 'Critical Questioning' and a weak one for 'Recall' for high achievers. Against this strong satisfaction of · low achievers towards 'Recall' and a feeling of dissatisfaction towards 'Q' mode of cognitive style.

Further, the high achievers tend to impress a high loading on $(Q \rightarrow R)$ scale, labelled in this study as curiosity scale and the low achievers on $(R \rightarrow Q)$ mode the 'Memory' scale or lack of curiosity scale. The one (high achievers) exhibits strong favour for 'Q' and dissatisfaction to 'R'. For low achievers, high degree of agreement is shown for $(R \rightarrow Q)$ scale and dissatisfaction for $(Q \rightarrow R)$. Likewise, predominance of $(A \rightarrow P)$ the utility scale is shown in the preferences of low achievers and a predominance of 'Scientific rule' $(P \rightarrow A)$ in the preferences of high achievers. The Averages draw incentives for their achievement from scientific curiosity $(Q \rightarrow R)$ and also from the utility scale $(A \rightarrow P)$

The study, which was only expected to repeat the findings of Pinchas Tamir (1976) distinguishes its observations with regards to its findings also. From strong agreement for 'Q' and dissatisfaction for 'R' to strong favour for 'R' and disfavour for 'Q' changes the notations of the scales also. The only similarity which one can locate in the findings of this study and those Tamir, is 'Bipolarity' rather than four - discrete modes of preferences; which is basic for any cognitive model.

The trends that figures separately the high, the average and the low achievers from each other are cognitive styles. These cognitive styles are the scales which symbolise and figure the achievement of girls in Home Science. As such, the appreciation for scientific curiosity and scientific rule styles signify girls high achievement in Home Science. While in adopting more realistic memory and utility styles; a premium may be placed upon the achievement of the students. No cause and effect relationship can be formulated but a pattern of cognitive style derived here in this study may help the educators and the planners in this field to teach

styles for higher achievement of students in Home Science. These findings are in agreement with Tashner (1973); Williams (1975); Tamir & Kempa (1977) and are in disagreement with others like Heimbuch (1977), and Tamir (1975), who found different styles related with the achievement of the students.

The novelty of this study is the emergence of a new and additional factor in the preference of high achiever girls in Home Science. That is, the technology factor $(A_+ \rightarrow R_-)$. It is a prospective factor which can potentially enhance the achievement of girls in Home Science. The findings of this study in fact lay emphases in process approach of learning. Increase learning by increasing the choices and dimensions of motivations of learning. This variety would certainly make subjects to attend to the contents of learning.

The discussions made above not only highlight the bipolarity in the observational structure of Heath's cognitive preferesnce tests but also disclose a close affinity between the cognitive styles and the achievement of girls in Home Science. The researcher intended to seek the bright prospects of predicting the girls achievement in Home Science. Now one standing on the sound base can proclaim that by teaching and developing $(Q_+ \rightarrow R_-) (P_+ \rightarrow A_-)$ and $(A_+ \rightarrow R_-)$ modes of cognitive styles of girls in Home Science, their achievement can be enhanced.

6

Presentation, Analysis and Interpretation of Data (Contd.)

Home Environment in Relationship to the Development of Cognitive Preferences Styles

Watson in his studies found the home to play dominant role in re-structuring, organizing and ordering the behaviour of child; which to us it is just perceived as the manifestation of child's interests, attitudes or the need achievements. Home is the first environment of the child. It is not only the parent-child interaction, but also the sister-brother or other relatives interaction with the child. It represents the total climate of home in which the child is being reared. He feels happy or sad, he entertains high aspirations and hopes and himself cultivates the healthy environment of the home.

Pauline A. Jones (1978) studied Home Environment and its relations with development of verbal ability. Traditional approach was made in the assessment of home environment. Four factors were identified.

i)   Disposition to encourage the child to interact with his home environment on a verbal cognitive levels.

ii) To have high academic and vocational aspirations and expectations for the child.

iii) To have greater knowledge of and interest in the child's academic and intellectual development.

iv) To provide more material and organiational opportunities for the use and development of language ability.

In brief home was taken as a facilitating factor which encourages and fosters in, to provide help for the progressive development of the child. The present study is, but an extension of Pauline's study. It also seeks to account for the material effects of home on the cognitive development of the child.

The researcher has been successful in evolving twelve components of home environment, but the effective studies of home environment conducted, so far, have been limited to a global search of facilitating, inspiring a congenial home environment. Though physical facilities provided at home do make an environment for better learning but the researcher has been concerned with socio-psychological environment. A scientific procedure was employed in the development of Home Environment Inventory which is treated in chapter three. In factor analysis study this inventory derived 12 significant clusters, judiciously identified as factors of home environment, which are given below :

1.   Recognition of child as person.
2.   Care for the child.
3.   Observance of the family traditions.
4.   Parental aspirations for the child.
5.   Forbearance for child's wishes.
6.   Anxieties about the child.
7.   Reproaches and punishments for undesirable behaviour.
8.   Explaining undesirability of lie.
9.   Parental affection.
10.   Indoctrination.
11.   Encouragement for initiative.
12.   Freedom.

These finally derived components of the home environment were so set with regard to each one of the statement scale that each one of the statement expounded a high score for positive value of the statement; which favoured home environment. The statements negatively set were scored, the other way round. So that, positive high scale was in favour of home environment. It can

be interpreted with facility, that higher score on home environment study stated the positive aspects of the home environment. It was proposed to be more suited, more receptive, more inspiring, more encouraging and so on. The lowest score on home environment inventory were proposed to be broken as, unsuitable for the growth and mental development of the child. If scores were taken as continuous distribution from lowest to the highest score, it proposes to be distributed on the linearity of the scale with the scores distributed normally. It means that not only the physical facilities in the home exist but also the total environment is related to the achievement of the students.

This test of home environment was administered to a sample of six hundred students who had also been scored for the cognitive style test in Home Science. The scores obtained were both analysed in terms of the factors of home environment as also for the study of patterns of Home environment from the age 13+ to 18+ consistently and a correlational study was also made to ensure the predictive validity of the Home environment scores with regard to cognitive styles. The weighted scores on cognitive styles were correlated with home environment scores.

Table 6.0

Showing age-wise coefficient of correlation obtained between cognitive styles and Home Environment Scores.

Cog. Syles Age groups in years	'A'	`P'	` Q'	`R'
13	0.40	0.13	0.20	0.14
't'	7.24	2.21	3.62	2.41
14	0.12	0.30	0.10	0.54
't'	2.06	5.34	1.72	10.34
15	0.66	0.48	0.15	0.21
't'	11.89	8.96	2.58	3.62
16	0.32	0.83	0.29	0.12
't'	5.68	20.51	5.17	2.06
17	0.12	0.11	0.37	0.56
't'	2.06	1.89	6.72	10.86
'18'	0.19	0.18	0.26	0.43
't'	3.27	3.10	4.82	7.93
Total	0.19	0.22	0.46	0.27

It is true, the physical facilities do seem to make the home environment conducive but the researcher's environment is more psychological which she measured with 12 components already stated. The correlation matrix presented above describes correlation computed between the pairs of each one of four modes of cognitive styles and the total environmental scores obtained by the subjects on all the twelve factors of Home Environment with regard to age groups and also for a total subjects.

The amount of correlations obtained though small are but significant at 0.05 or 0.01 levels barring a few inter age group 14+ only. The number of subjects being large, even the small coefficients of correlations become significant. Table 6.01 reveals that Home environment is not correlated with the Questioning mode of the cognitive style. This can be interpreted in a way that all correlations being significant this insignificant correlation might have occurred because of the large amount of errors introduced in the performance by 14+ years of girls on the performance of cognitive styles test. Even otherwise, this correlation is positive and just escapes the satisfaction of the criterion of the test of significance.

The cognitive styles as measured by Heath and followed by the researcher in this study was a preferences mode in which the items were favoured in order to preference allotted to the four choices of the Question. In the beginning the cognitive preferences were taken as cognitive abilities but the representations that follow in the item belong to 'can do' and 'does do' type of objectives. The nature of the items places the cognitive preferences as style-type of objective in terms of attitudes and interests. Harris (1978) affirms that 'can do' types of behaviours of the subjects focus on achievement testing. These are the knowledge, skills and ability type of objectives. But, what a student typically 'does do' in the preference mode belongs to the affective domain of subjects' preferences. Therefore, cognitive preferences may be taken to occupy the middle position on the cognitive-affective-continuum. The lead was taken by Heath in this direction. He defined cognitive preferences as a different modes of attending to the subject matter of the course. His approach marked an important step, in the field of cognitive styles research. His four modes 'A', 'P',' Q' and 'R' may also be taken as students performances both in cognitive and affective domains.

The positive and significant correlations obtained between the four cognitive styles and total environment score can not singly be accounted for either achievement of the students or of the interests, aptitudes and preferences of the students. It can simply be interpreted the way that cognitive styles as they represent both the ability and personality dimensions of students functional behaviours together go with the congenial home environment i.e. if in a family the child has a recognition he is carefully looked after, the parents nurse high aspirations for children, they forbear child's wishes and on occasions suited for showing anxiety for the children, they display anxiety or there is a downpour of the parental affection on the children, parents encourage initiative and permit freedom, they show high achievements both on ability and personality trait tasks. Accepting the negative approach of the home environment the parents do not strictly observe family traditions for their children. The reproaches and punishments are negated. There is no indoctrination in that environment of the family and also the children grow in them healthy, desirable social interests and attitudes and their achievements are also significant.

The correlations in Table 6.01 are presented on a venerable consideration of age to see, if age was somehow a considerable factor in defining the home environment and cognitive styles relationship. The previous findings in this regard indicated that modes of cognitive functioning becomes progressively more articulated and perceptions more home environment dependent. In view of these findings of Witkins the researcher feels somehow discouraged that age factor plays no significant trend towards either progressive or regressive sides with regard to any of the mode of preferences installed by the researcher on Heath's model of cognitive styles. The only inference that the researcher can draw from these findings is that age as an independent factor is ineffective in the home environment and cognitive styles relationships.

Study of Relationship of Cognitive Styles and Individual Factors of Home Environment

The traditional approaches to the measurement of home environment have usually been limited to obtaining certain crude indices of correlations such as socio-economic level of the parents,

achievements, intelligence and certain personality traits etc. Their explanatory forces have been clearly weak. Wolfs (1963) made an advance and inferred from the findings that home environment components account for three times as much of the variance in I.Q. as socio-economic status alone. Wolf made a factor analysis study and revealed a single general factor, and the total environment ratings was highly related to over all intelligence. Mosychuk (1965) in a modified study conducted with regard to home environment inferred that measurement of home environment treated differentially was more useful and predicted differential effects on such variables as abilities, interests and attitudes etc. The researcher in an attempt to follow Mosychuk computed, correlations between four modes of cognitive styles with each one of the twelve components of the home environment inventory.

Wilkins in his efforts to uncover possible origin of these cognitive styles which he studied along with his associates investigated patterns of maternal child rearing practices and mother child relations on the basis of interview data. The mothers were classified into two groups : One, those who fostered the child's differentiation from herself and also who helped him developed a sense of separate identity, and the other, those who did not. In general this classification of mothers was found to be significantly related to the performance scores of children with the children of mothers judged to have fostered differentiation being more field independent and cognitively articulated.

The differences were noted in the type of defence mechanism that was adopted by subjects at the two extremes of global and articulative cognitive styles when confronted by conflict and stresses. The articulated subjects were more likely to use specialised defences such as intellectualization and differentiation and global subjects are more likely to use primitive defences. The study quoted above was an experimental study and was not very much relevant to the present one. The only reference that the researcher seeks here is that home environment was studied by Witkins also with regard to the parent-child relation and child rearing practices though the dimensions of the study were different. It only refers to that, if rearing practices foster independence there emerges a field independent cognitive style in the behaviour of the children. This dependence and independence of cognitive styles was studied by the researcher also in terms

of correlation obtained between the four modes of cognitive styles and the scores gathered for the twelve factors identified by the researcher in her home environment study. The coefficient of the correlation obtained are presented with Table 6.02.

Table 6.02

Showing coefficient of correlation obtained between cognitive style scores and twelve factors of Home Environment.

Sl No.	Home environment factors	'A'	'P'	'Q'	'R'
1.	Recognition of a child as person.	0.36	0.42	0.45	0.38
2.	Care for the child.	0.4	0.28	0.25	0.10
3.	Observance of family traditions.	0.10	0.09	0.12	0.11
4.	Parental aspirations of the child.	0.42	0.34	0.48	0.32
5.	Forebearance for the child's wishes.	0.27	0.18	0.52	0.18
6.	Anxiety for the child.	0.12	0.08	0.12	0.10
7.	Reproaches & punishments for undesirable behaviour.	0.11	0.12	0.09	0.06
8.	Explaining undesirability of lie.	0.19	0.23	0.52	0.36
9.	Parental affection.	0.36	0.43	0.56	0.48
10.	Indoctrination.	0.11	0.16	0.32	0.12
11.	Encouragement for initiative.	0.42	0.35	0.48	0.43
12.	Freedom.	0.18	0.30	0.56	0.40

The scrutiny of Table 6.02 describes some of the correlations as significant while others as insignificant. With the standard error of measurement equal to 0.06 all correlations above 0.12 are significant at 0.05 level. The correlations beyond 0.05 are

significant at 0.01 level. With this criterion of coefficient of correlations given above the study seeks to interpret the data as below.

Out of all the indices of correlations computed between the pairs of cognitive styles :'A', 'P', 'Q' and 'R' and each one of the components of Home environment the significant correlations were obtained for the factors, 'Recognition of child as person', 'Explaining an undesirability of lie', 'Parental affection', 'Encouragement for initiative' and 'Freedom' all the four modes go with the factors enlisted above i.e. if children as persons are recognized behaviourally, if the children are congratulated by the parents on their significant achievement, if children's problems are invariably solved by the parents, if children's ideas are praised and also they are better directed and praised for their socially useful productive work, there is a simultaneous improvement on all the four modes of cognitive styles.

Likewise, this improvement is affected by 'Explaining children the undesirability of lie', 'Parental affection' in terms of consoling child when he is unhappy, displaying happiness before outsiders for children's ideas, disclosing difficulties and improving upon them.

'Encouraging children's initiative' in their behaviours like satisfying curiosities of children by encouraging them to put in hard labour, showing pleasure on even the smaller investigations made by the children.

The 'Freedom' also is highly correlated with all the four modes of cognitive styles just as the children be loved, children be free to hear radio programmes, they should be free to work by themselves. They be allowed to purchase any magazines and newspapers. Sometimes children's anger be tolerated and they should be allowed a a good sleep.

But, the discriminating behaviour displayed by an amount of correlation is also evident from Table 6.02. The highest correlations are obtained on 'Q' and 'R' modes stating that, if the child is recognized as person in the family, if the undesirable behaviours are explained, the parents display deep affection, encourage children's initiative and permit freedom, it is followed by the critical Questioning of scientific information, its completeness general validity and limitations and also in the acceptance of information for its own sake without considering its usefulness

that is with the factors mentioned above in the congenial home environment, the Recall and Questioning modes grow. With regard to the educational implications for increasing children's educational achievements, the most desirable instrument is to make the home environment more suited to disposition or taste of the child employing fullest expression of child's interest and aptitude, pouring parental affection, encouraging them and permitting them freedom for growth.

The significant correlations between the four modes of cognitive styles and the two factors of home environment i.e. 'Parental aspirations' and 'Forbearance for the child's wishes' are also found. Though the correlations are not high but because of the large sample they have been realized significant. The behaviours that cluster round the parental aspirations define certain limitations and a few aspirations for high achievements. Such behaviours when clustered would naturally display positive correlations with cognitive styles and more significant with 'Questioning' and 'Application' mode. Though the correlations with the factor 'Forbearance for the child's wishes' are also significant but to a high cognizable degree with 'Questioning' and 'Application' mode. Although the behaviours that cluster round this factor are more of the nature of the physical facilities provided by the parents to the child. Such facilities describe care of the parents towards the child and would naturally help in the enhancement of educational achievement of their daughters, bound to give significant correlations with the achievements of the children and hence are the significant correlations.

Insignificant correlations are obtained between the cognitive styles scores and certain factors of home environment supposedly be taken to be socially negative, such as the 'Observance of family traditions', 'Reproaches and Punishments' and 'Anxiety for the child'. It is not surprising that negative correlations are not obtained but it is significant to note that the relationship between these factors and their cognitive styles is also not cognizable i.e. observance of family traditions like reproaching, feeling sorry for the child's behaviour, wishing the child to help in the household work, following life style of the parents, working hard in the family, taking care for the physical survival of the child etc. are uneducable correlates of the home environment. Likewise, reproaches and punishments are unsuited to any cognitive development of the

child. The findings reveal that the parents may avoid punishments to work more, beating and feeling sorry for sometimes not obeying the parents. These behaviours may train children for social life but as cognitive correlates the behaviours are untenable.

'Care for the child', 'Anxieties for the child', and Indoctrination' in the home environment are the three main factors which supply varying degree of correlations with the four cognitive styles. The reasons can be sought in the nature of cognitive modes itself as also in the nature of the home environment. This factor 'Care for the child' includes the physical facilities which seem to provide overprotection and may sometimes act negatively. These facilities which cluster under 'The care for the child' have nothing to do with facilities for the cognitive development. Likewise, 'Indoctrination' is defined as criticism of certain behaviours of child, imposing upon the child the worship of God and Goddesses. These behaviours do not include a fair analysis of what the parents opt to indoctrinate. This trend of 'Curiosity' located in the behaviour of children can be associated with child's inquisitiveness about 'Why so much of protection'? Why indoctrination by parents ? Is it for their survival alone. Is indoctrination the psychological satisfaction of the parents to see an identity in their own daughters ?

The factor 'Anxiety for the child' is a wish to see child's survival not necessarily to see him happy and well placed in life with regard to the scales that cluster round it. These behaviours have nothing to do with the cognitive development of the child. Even the amount and nature of correlations obtained crystallise no definite trend, The correlations with 'Anxiety' factor are all poor and insignificant. While with two other factors the 'Care for child' and 'Indoctrination' significant correlations are found with two modes: the Principle and Questioning. This relationship recalls to us the well crystallized factor, the scientific curiosity, of Pinchas Tamir (1976) and Kempa and Dube (1978). The significant correlations obtained between Principle mode and the 'Care for the child' can also be interpreted in terms of the utility which the child looks into the favour of their parents which they provide in return to their children.

So, the twelve factors of home environment do seem to play differential roles with the four cognitive styles of the girls in Home Science test. The 'Recognition of child', 'Parental aspirations',

'Forbearance for the child's wishes', 'Explaining undesirability of lie', 'Parental affections', 'Encouragement for initiative' and 'Freedom', these seven factors in the home environment are potent to define significant positive role of Home environment in ascertaining the cognitive style of the students. They, indicate a field independence mode i.e. a dependence upon these factors for the better perform-ance of students cognitively, while the factors like 'Observance of family traditions', 'Reproaches and Punishments' and 'Anxiety for the child' are, though not the inhibiting factors but also do not anyhow seem to affect the cognitive styles. That is the researcher entertains no happy prospects of higher achievements for girls, even if the education for these factors is provided. They are rather irrelevant as cognitive determinants of the performance of students. the other factors like 'Care for the child', 'Indoctrination' and 'Anxiety for the child' do have a positive role to play but indirectly. These may be allowed to function, but in terms of the physical facilities which may even support temperamental encouragement to the children. The researcher, therefore, concludes that certain factors in the home environment impinge upon the cognitive style of the students directly while a few others indirectly. The reproaches, punishments unnecessary care for the child which inhibit the freedom of the child may be ignored even otherwise, they may not act negatively in the cognitive development of the child.

Study of Patterns of Home Environment of the Subject Sample

The subject sample comprises sample of girls drawn from different patterns of Home environment. In the preceding pages, theories about the relationship between Home environment and the modes of cognitive preferences have been related without a considerate review of the patterns of Home environment of the girls selected in the sample. The relationship established as inference of the data analysis can only be validated in the context of the patterns of Home environment of the subject sample. So, the researcher in the end of the study has presented a profile that

would be significant enough, to establish the validity of the inference drawn compatible with the nature of the sample selected.

Home environment as such is being studied since 1925 by Klein & Lynd etc. A study was conducted by Levy (1931) who found that, 'over-protection leads to submission, weak willed child is emotionally dependent upon the parents and is never satisfactorily growing up." Here some factors of Home environment were correlated with the developmental aspects of personality. Another finding was that acceptance of parental submission appears as over intelligence and leads to spoiled, selfish and aggressive child. Likewise, many other studies were conducted in sociology and psychology also. All these studies attempted correlational investigations to find correlate of one variable with the other. Such as Dorothy (1937) crystallised the findings that under-protection and under-affection lead to feeling of insecurity and sometimes an anti-social behaviour on the part of the child. In another study high degree of correlation was found between behaviour and marital adjustments of parents. Yet, in another study Carter(1954) found that child's feelings about himself were affected by the kind of relationship between his parents. Elizabeth Hough found that over-affection and over-protection tend to produce the spoiled child. Terman supported firm instead of hard discipline for the child in the home. Most of these studies were conducted in 1940's and 50's. Such correlational are not rare. But even after turning the pages of several journals the researcher could find no study on the patterns of Home environment which could justify the findings of correlationalsstudies. The Home environment inventory developed by the researcher consisted of 48 scales clustered into twelve factors labelled as factors of the Home environment. The inventory was supplied with an answer sheet provided with five point scale for each statement of the home environment inventory. The purpose of scoring was to collect frequency counts on each one of the five points scale beginning with 'never' and ending in 'always'. Score of one was awarded for each frequency of 'never' and sequentially five for 'always'. Thus the total score for each factor and thereby the mean and standard deviations calculated are given in Table 6.03. These indexes are also displayed through a profile presented here :

Table 6.03

Showing mean and standard deviations of the scores obtained
on the twelve factors of Home-environment.

Factors	1	2	3	4	5	6	7	8	9	10	11	12
Mean	3.82	3.95	3.49	4.15	3.55	3.41	2.87	3.16	3.31	3.82	3.75	3.48
S.D.	1.38	1.13	1.43	1.19	1.18	1.67	1.56	1.33	1.57	1.17	1.35	1.46

Scrutiny of Table 6.03 reveals that the mean score vary from minimum 2.87 to 4.15 maximum. The variabilities of scores of the 12 factors define the distribution of scores as homogeneous on the 12 factors. The S.D. Values for these factors do not significantly differ. If these mean scores are taken to profile as shown in the Table 6.01.

The mean scores obtained for different factors justify that in most of the cases the frequency counts describe the factors as 'frequently' and there is a single factor i.e. 'Parental aspirations for the child', where in they evaluate the factor in the proximity of 'Always'. The girls record that the parental aspirations are very high for their children while on factors 'Recognition of child as person', 'Care for the child', 'Indoctrination' and 'Encouragement for initiative' have been so frequent. It is not surprising that while the parents feel that their daughters achievement should be very high, they are full of praise for them, they remove their difficulties, they provide them all facilities in all the affairs of home, school and journeys. Even otherwise, they do not spare their children to 'Indoctrinate' and they encourage their children by showing happiness on their achievements, encourage labour and research. So, the behaviours of parents towards their children is balanced. There is only one factor 'Reproaches and punishment', which is found to have a low frequency count i.e. 'Rare'. Other factors like 'Observance of family Traditions', 'Forbearance for child's wishes', 'Explaining undesirability of lie' and 'Freedom' which are moderate, the pattern of home environment, therefore, seems to be social value oriented where in freedom, if not restricted is somehow moderate. 'Indoctrination' of Observance of family traditions is

moderately given, undesirability of social lie is explained. Anxieties about the child is moderately shown; this is usual and extreme points of anxiety either very cold or very warm are not shown by the parents towards their daughters. Reproaches and punishments are mearge because the girls are treated more fairly than the boys and culturally too. In this social structure the girls are more pertinent and better adjusted both in home and school. So the reproaches are infrequent.

The picture that is reflected through the readings of Table 6.03 in turn reverberates the social cultural behaviour of the girls of middle class families in India. Primarily, the very high aspirations were not nursed by the parents, but with the growing dearness, costlier living the parents seem to nurse high aspirations for their daughters careers also. The findings reveal that home environment of the girls are comparatively more congenial just possible, the girls drawn to school in the sample even today come from at least middle class families of the social structure of Agra city.

7

Summary of Findings
and Conclusions

The present investigation was designed to study a cross sectional behaviour of adolescent girls from 13+ to 18+ with regard to their cognitive development and also to study, how the independent variables, age, achievement, social class scale and home environment affect the cognitive behaviour of girls studying Home Science. The proposal of the investigation germinated in the inspirations received from the theories of Atwood, Witkins and Heath on the development of cognitive styles of students. Some of the well founded studies in the area provided a clue that there lay ample of educational and evaluation processes in cognitive styles studies. When Harris stated that most of the achievement testing focus on 'Can do' class of behaviours; preferred to be knowledge, skill and ability type of objectives but there would be other objectives also as the achievement of class room teaching which is evinced by what the student typically 'Does do'. These are attitudes, interests, cognitive styles etc. perhaps more effective than cognition itself (Harris, 1974).

The novelty of the theory, how students attend to the learning material propounded by Atwood, Witkins, Tamir etc. caught the attention of everyone concerned with education in recent years. A good deal of energy was spent in explaining the intricate theoretical spiders web on the development and implications of cognitive styles in education; a good many authors were assembled in the search for cognitive functioning. Taking that the studies of this type would be more beneficial in the context, not only of science education but also in improving the teaching, learning of Home Science of girls in the class room in the development of

curricular and instructional material and technologies. The researcher expected a brighter prospect for logical innovations that would evolve out of the findings of this study; the study of the four modes: `A', `P', `Q' and `R' would enlarge the mental horizon and evolve a novel process approach for better teaching learning situations of the girls in the class room. Hence the present project was undertaken.

The philosophical background of the nature of the development of cognitive styles of girls with fullest comprehension of empirically investigated evidences of has this development occurs and how can it be best accelerated to the best knowledge of the girls and their capacities with references of research findings both contradicting and supporting have been provided in chapter one along with the limitations of the study. The issue of the present study and the references quoted from the journals and books are provided in chapter two. For fixing priority for action for the developmental study the researcher designed tests to be administered to the students with statistical techniques to be employed, their justifications, the sample, its nature and procedure of selection have been provided in chapter three; with the full context and comprehension of objectives underneath. The specific to this study was construction of a cognitive styles test on Heath's model. Its full mode of development with comprehensive design of ascertaining reliability and validity have been provided in chapter four. While in chapter five and six the analysed data is presented with its appreciation of findings. A brief summary of conclusions drawn is inducted in chapter seven of this study.

FINDINGS

Pursuance of the objectives of this investigation involved several sorts of analyses of the data regarding the development of tools and identifying the correlates of age, achievement, social class and home environment in cognitive styles of the students. It was done in accordance with the design defined in chapter three, consequent upon which certain findings were arrived at, which are presented below :

Findings with regard to cognitive styles of high school girls in relation to their varying age-groups

1.   The cognitive preferences of the individuals are stable as no
     significant differences across the age are identified from the
     analysis of the data gathered on this study.

2.   Individuals also do not significantly differ in styles across the
     age; it is a corollary of the thesis given above. When
     individuals do not differ on the mode of preferences across the
     age, their cognitive styles will also remain immutable during
     the whole period of adolescence.

     In this regard three measures were adopted to analyse the
data. A chi-square test of independence, between age and
cognitive styles; two way mean-square analysis of variance be-
tween age and cognitive preferences; age and cognitive styles and
also between styles and preference :

1.   The value of chi-square obtained was 176.22 which was
     much more than the required value of significance. The
     hypothesis is therefore, retained. The two variables, tested
     are independent of each other. The performance of girls on
     cognitive styles test is not affected by their growth in age, as
     none of the two impairs the loss of the other one. The cognitive
     styles therefore, remain stable across the adolescent age of
     the girls.

2.   The two way analysis of variance study corroborated the
     above findings. The variations in the cognitive styles of students
     are independent of varying differences of age of the girls.
     None of the 'F' values showing variations of age, styles or
     interaction between age and styles is found significant. Any of
     the variables proposed to account for the variations in the
     cognitive style of girls is rejected. The cognitive styles of the
     girls are found stable on variance-analysis study also.

3.   The mode of scoring that is the allotment of preferences, 1,
     2, 3, or 4 in cognitive style test were found inert in this case also
     the variation in the individuals could not be accounted for the
     individual differences or for preference modes . Even the age,
     preferences are not found.

4.   None of the significant 'F' values was obtained with regard to
     the two way analysis of variance study conducted on

cognitive style and cognitive preferences but, the inter-action between the two was computerized as significant at 0.01 level. These findings were concluded as below :

i.   Cognitive preferences are stable along the age.
ii.   Cognitive styles also remain stable during the adolescents.
iii.   But, the nature of preference that is ordering mode 1, 2, 3 or 4 is determined by the cognitive styles.

Findings with regard to cognitive styles of high school girls in relation to achievement in Home Science

The purpose of the present investigation was to see how the high, average, and low achievers differ in their modes of cognitive styles. The means 'A', 'P', 'Q', and 'R' for high, average and low achievers were separately calculated and were tested for significance. The high, average and low achievers were found to differ on certain styles where no significant differences were found on others. The consistently significant differences on 'Q' and 'R' modes were realized between the pairs of high, average and low achievers. The mean scores on 'Q' mode from the high to low achievements of the subjects were found to · be consistently decreasing while the trend was reversed on 'R' mode of cognitive styles and the mean scores from high to low achievement of students were consistently found increasing. The 't' values were found significant at 0.01 and 0.05 levels both on 'Q' and 'R' modes. The above findings were concluded as :

The girls in general express preference for Questioning mode of cognitive functioning in higher mental functions. This is a subject matter of sophistication and represents higher general intelligence in their performances. It is proposed to explain the higher academic aptitude motivation for learning and intellectual curiosity and this causes the higher achievement of girls in Home Science. It signifies the fact the 'Q' mode being symbolic of higher mental functioning of the girls is naturally instrumental in the higher achievement of girls gradually because the style of 'Q' mode decreases from the highest achievement to the lowest achievement of the girls can only be inferred as a responsible factor

for the achievement in the examination. Therefore, it was concluded that the higher 'Q' goes with high achievement in Home Science.

But a negative trend in 'R' mode i.e. the higher recall goes with the low achievement of girls in Home Science does not at first sight seem to be justified because the modern examination system is mostly recall oriented. So the accusation of examination system is either false or the findings be taken as wrong. But since the findings are practically achieved readings of the researcher it can only be inferred that the examination system even now is not recall oriented in Home Science. It is a style of the low achievers that they lay emphasis on cramming consequently their achievements are low. The examination systems are still dependent upon critical Questioning of information and calls for its validity, and considerations of implications, applications and enquiry are still maintained.

The study was further extended and a correlational analysis was made between the cognitive style scores and achievement scores of girls in Home Science. The analysis supplied only two significant indexes of correlations i.e. for the factors : Questioning (0.404) and Recall (-0.289). For one it was positive and for the other negative. These indexes confirm the above findings that high achievement of girls goes with Questioning while this achievement is inversely related with Recall style of learning. It is concluded that cognitive style of girls in Home Science are partial determinants of their achievements. The 'Q' and 'R' modes of preferences; are found to be associated with the achievement of girls in home science, while no such association exists between utilitarian modes 'A' and 'P' and girls achievements.

Findings with regard to cognitive styles of High School girls in relation to their social class

The purpose of the study was to correlate the four modes of the cognitive style with their social class scores. The indexes obtained for 'A', 'P', 'Q' and 'R' modes were : 0.165, 0.129, 0.354 and 0.222 respectively. The correlations were meagre for 'A' and 'P' modes and high for 'Q' and 'R' modes. The sample of study being large even the low correlations become significant and the natural outcome of the findings of these correlations is that each one of

these four modes go with the social class of the girls students i.e. the higher the social class, the higher are the performances of girls on 'A', 'P', 'Q' and 'R' modes but when all the four modes are positively correlated levelling of these four modes was done in relation to the social class of the girls on the basis of the amount of correlations obtained. The interferences drawn were that 'Questioning', 'Recall', Application' and 'Principal' was an ordered sequence.

Findings with regard to cognitive styles of High School girls in Home Science in relation to preference & ability modes.

To study this the four modes of the cognitive styles were intercorrelated and cluster analysis was done. It was done to affirm Gardner's claim that the distinction between mode of preferences and ability style is artificial and depends upon the nature of the information presented to the learner i.e. the styles are independent of the nature of the subject taught. A bi- polar mode of the cognitive functioning was obtained from cluster analysis of the intercorrelations between the four modes i. e. 'Q' (loading 0.868) and 'R' (loading - 0.938) and 'A' (loading -0.814), 'P' (loading +0.902). It follows from this that cognitive styles are predominantly oriented along two independent bi-polar axes as Critical Questioning — Recall, and Fundamental Principle —— Application. Therefore, it would be much more justified to express these modes as bipolar scales, the curiosity and utility scales. These findings are analogous to other findings conducted by Kempa & Dube (1978). R. Chandra (1983) etc. Intuitively, these factors are interpreted as field independence and dependence or analytical or global styles. In view of the above observations the researcher concludes that cognitive function is independent of the information taught and the distinction between the preference and ability modes are artificial.

The findings with regard to cognitive styles scales of High-School girls in relation to achievement in Home Science.

When two independent bi-polar scales were identified it became an inevitable corollary of the work conducted in seeking relationship between achievement and cognitive styles scales of

high school girls. To achieve this, the cognitive style scores of high, average and low achievers were computerized for factor analysis and different modes of styles were identified.

The table is reproduced below :

Sl No	Factors identified	High achievers		Average achievers		Low achievers	
1.	Scientific Curiosity	Q —> R		Q—> R		-	-
		+	-	+	-	-	-
2.	Utility	-	-	A—> P		A—>P	
				+	-	-	-
3.	Memory	-	-	-	-	R—>Q	
						+	-
4.	Scientific Rule	P —> A		-	-	-	-
		+	-				
5.	Technology	A —> R		-	-	-	-
		+	-				

The high achievers tend to impress high loadings on Q+ ——> R- mode, 'curiosity scale' while the low achievers on R+ —> Q- mode, 'Memory scale' i.e. lack of curiosity. In the same way on the second factor the high achievers tend to impress upon P+ ——> A- mode, 'scientific rule' while the low achievers on A+ ——> P- mode the 'utility scale'. The averages draw incentives for their achievement from high and low achievers both. It is why, the factors identified are curiosity and utility scale. Yet, and additional factor representing A——> R i.e. 'Technology' factor is identified in the high achievers girls, if the factors identified in this study are taken as symbolic the curiosity, scientific rule and technology, the three factors may be described as instrumental for the high achievement of the girls in Home Science, while dependence upon the 'Utility' and 'Memory' factors may make these girls achievement low. The utilitarians seek benefits out of everything, therefore, they are poor in their conceptual developments. The studies become less important, that is why their achievements are also poor.

Findings with regard to cognitive styles of High School girls in relation to their Home environment.

It was again a study impressed upon in finding out the age-wise correlations between the pairs of four modes of cognitive styles and Home environment scores. It was done to see, if the cognitive styles and the Home environment relationship was stable across the age. The previous findings in this regard indicated that modes of cognitive functioning becomes progressively more articulated and perception more Home environment dependent. In view of these findings of Witkins the researcher could find no significant trend either towards progression or regression with advancement of age. Although almost all the correlations obtained were positive and significant at 0.05 level except the correlation between the variable Home environment 'Q' mode for 15 years of age of children and Home environment and 'P' mode for 17 years. The only conclusion that the researcher can draw from these findings is that each one of the four modes of cognitive styles are positively and significantly correlated with the Home environment scores. Even otherwise, the correlations obtained are not so high to make prediction of one from the other.

The study was further extended to identify twelve factors in the Home environment. The factors scores were separately correlated with independent scores of four modes of cognitive styles. The following trend emerged from this study :

The twelve factors of home environment are found to play differential roles in its estimates of correlations with regard to four modes or cognitive styles of the girls in Home Science test. The factors 'Recognition of child', 'Parental aspirations', 'Forbearance for the child's wishes', 'Explaining undesirability of lie', 'Parental affections', 'Encouragement for intiative' and 'Freedom'. These seven factors in the home environment are patent enough to define significant positive role of Home environment in ascertaining the cognitive styles of the students. These factors have been found to bear positive and significant coefficient of correlations with the scores of all the four (A, P, Q, R) modes of cognitive style developed on Heath's model. These coefficient range from minimum 0.10 to 0.46 maximum. The dependence of cognitive modes can be justified on the basis of

amount of coefficient of correlations obtained. The presence of field dependence and independence cognitive function in girls is, hereby, justified. These correlations for the factors 'Observance of family traditions', 'Reproaches and punishments' and 'Anxiety for the child' are just in the proximity of 'zero'. None of the correlation with regard to these factors is significant. That is, the researcher entertains no happy prospects of higher achievements for girls, even if the education for these factors is provided. They are rather irrelevant as cognitive determinants of the performance of students. The other factors like 'Care for the child' and 'Indoctrination' have a positive role to play but indirectly. The factors are found significantly correlated with Questioning, Principle and Recall mode of the cognitive style scores of the girls. These modes may be educated to function fluently, but not in terms of providing physical facilities alone. Care includes mental and emotional satisfaction also which the total home environment should inspire and encourage. The researcher, therefore, concludes that certain factors in the home-environment impinge upon the cognitive style of the students. So, the twelve factors of home environment are found to play differential roles in its estimates of correlation with regard to four modes of cognitive styles of the girls in home science. The seven factors have been found to bear positive and significant coefficient of correlation with the scores of all the modes of cognitive style developed on Heath's model. These coefficient range from 0.18 to 0.56 maximum. The dependence of cognitive modes can be justified on the basis of amount of co-efficient of correlations obtained .... The presence of Field dependence and independence cognitive function in girls is hereby justified.

The correlations for the factors 'Observance of family traditions', 'Reproaches and punishments' and 'Anxiety for the child' are just in the proximity of 'zero'. None of these factors contribute to the development of any of the cognitive styles . Even otherwise, the frequent occurrence of reproaches and punishments, undeserved care for the child and observance of family traditions may play an inhibitive role in the girls achievements and free development of the child. These are negative factors of home environment and may be safely ignored.

Findings with regard to the Patterns of Home Environment

The Home environment inventory administrated to subject sample evolved 12 factors in the home environment. The mean score for each one of the student for each one of the factor ranged between minimum 2.87 for the factor 'Reproaches and punishments' and maximum 4.15 for the factor 'Parental aspirations for the child' i.e. reproaches and punishments are rarely used in the families of these girls while majority of the girls recorded that their parents nursed high aspirations for their daughters on factor' Recognition of the child', 'Care for the child', 'Indoctrination' and 'Encouragement for Initiative' the parents very frequently inspire, while on factors, 'Forbearance for the child', 'Anxieties' about the child','Explaining undesirability of lie', 'Parental affection' and 'Freedom ' the parents displays moderate behaviour with regard to their daughters i.e. sometimes they restrict and so often, they allow freedom. These are the cultural trend of middle class families of Agra city which may be taken as a trend of U. P. culture. The girls have been selected from Intermediate Colleges of Agra city. The reflections of the patterns of home environment reveal that the girls from middle class families come to seek admissions in these schools.

Areas for further research

As the issue of present problem was being probed, some other fresh issues related to the area of the present study were thrown like side winders for further research,these issues not only go deeper into the problem but it includes fresh areas of researchers also which the researcher feels would be more relevant to the study of cognitive styles.

i.   In the present study only the girls were included under the limitations of selecting Home Science discipline for cognitive styles study. The researcher feels the cognitive style study be extended to the subjects like Mathematics, English languages and other humanities to cover a wider field of study as also it

may give a chance of including both boys and girls in the sample. The study, therefore, be enlarged in the area of subjects and nature of sample.

ii.   The researcher feels that the variables she selected were very relevant and substantially significant but the most important variable the interactional style of the teacher in the class room which has been ignored in this study should be deliberated for investigation. This, the researcher feels, would supply better indexes or relationship for planning curricula and procedure of evaluating the subjects.

iii. Presently, the emphasis is being laid on the upbringing of the lower strata of the society and more prominent in them being the tribals. Their growth and development is inhibited by a number of factors. Their cognitive styles may supply a different structure and texture for planning their education according to their own styles.

iv.   The researcher modelled his study on Heath's approach. The field-independence and dependence, analytic and global styles have so far been ignored in the studies conducted here in India. The researcher may crystallise some structures other than the present study has obtained. This would help plan and restructure curricula accordingly.

v.   The researcher has studied Home environment where significant positive correlations have been realized between the components of Home environment and those of four modes of cognitive styles. A significant trend of re-organising education of girls in Home Science has been indicated. This trend should employ attention of the researcher to seek dimension of Home environment which in fact enhance learning and thereby the achievement of girls.

vi.   Though the findings of this study reveal scientific curiosity, scientific principle and Technology factors instrumental for the high achievement of girls. Remedial measures be taken for planning lessons on these models may justify the findings of this study. The researcher is therefore, led to suggest that certain remedial studies on curriculum planning teaching technology and its applicability in society should draw the attentions of researchers in this area.

Suggestions on Limitations of the Study

The present project was taken essentially as an exploratory investigation intended to verify the work done by Atwood, Heath, Kempa and Dube, and Pinchas Tamir etc. and the findings mostly centred round the investigation that cognitive styles were stable across the age and the distinction between the cognitive styles as preference and cognitive styles as ability were artificial. This was the subject of study of Gardner also. Nothing was done to simplify but to adapt to Indian situations and limiting the area to girls only The reliability and validity was accorded for few and not for all. The author of the present study feels that the task be picked up from Indian situations selecting the acute problems of education with well defined reliabilities of the study.

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